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Is Listening Comprehension in a Foreign Language Affected by Age?

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***Background*:** The development of listening comprehension in a foreign language is a complex process, interrelated with the progress in other language skills, and could be affected by numerous variables, including age. This study responds to middle-aged adults' complaints about their difficulties in listening comprehension in English as a Foreign Language (EFL) by examining the relationship between the success in listening comprehension in EFL and age. Although age is considered a crucial factor in language acquisition, there is a lack of studies providing evidence on the relationship between age and listening comprehension achievement in a foreign language in adult learners.

***Purpose*:** This study aimed to find out whether age is one of the significant factors affecting listening comprehension in relation to other language skills.

***Method*:** Quantitative data analysis was used to determine the relationship between the success in listening comprehension in EFL and age in 1,323 Czech adults. Analysis of variance (ANOVA) was used to compare the success in listening in three age groups, tested within five academic years. Then a generalized linear model was used to assess the relationship between the success in listening and age.

***Results*:** The analysis of variance has shown that the age group 21—30 achieved significantly better results in listening than the age group 41—60 at $p < .05$. The logistic regression curve has illustrated a gradual increase in the percentage of 'unsuccessful listeners' aged 25 to 52 in relation to age. Thus, the study offers empirical evidence that there is a negative correlation between the success in listening comprehension in a foreign language and age.

***Implication*:** Educators should assist adult learners in developing knowledge, skills and strategies to overcome listening comprehension difficulties with respect to increasing age.

***Keywords*:** adult language learner, age, EFL, English language, hearing, listening comprehension, NATO STANAG 6001

Introduction

The initial impetus for this work came from a desire to react to middle-aged adults' complaints about their endless difficulties with listening comprehension in English language (EL) learning in the Czech military. In NATO member countries, adequate command of the EL is one of the prerequisites for a successful military career. Developing and maintaining EL skills in military personnel and civilian staff is a lifelong process, which is supported by numerous courses guided by NATO regulations.

In the Czech Republic, language training and testing is provided by the Language Centre (LC) at the University of Defense (UoD) in Brno. Military personnel and selected civilians working for the military have a chance to attend various intensive courses of different lengths and focuses, e.g., on general English in military context, or on specialized terminology. Over the course of years, we have witnessed several expressions of frustration from our same-age peers, the middle-aged faculty members and military officers, over the lack of progress in their listening comprehension. In some cases, these attendees worried about their listening comprehension so much that they developed anxiety, which contributed to their poor exam results in listening. Since most of the complaints and worries came from middle-aged personnel in their forties or fifties, such as distinguished faculty members or high-ranking officers, we decided to investigate whether there is a relationship between listening comprehension in a foreign language and age.

Background Literature

With regard to our research aim, the background literature is divided into several sections focusing successively on the importance of listening in foreign language (FL/L2) acquisition, the assessment of listening comprehension, the variables affecting listening comprehension, and the relationship between age and listening comprehension.

Listening Skill in Foreign Language Acquisition and its Assessment

Listening is considered to be the primary channel for communication. Feyten (1991) claims that more than 45% of communicating time is spent listening, which shows how essential this skill is in overall language ability. Buck (2001) explains the listening construct as a process in which

> the listener takes the incoming data, the acoustic signal, and interprets that, using a wide variety of information and knowledge for a particular communicative purpose; it is an inferential process, an ongoing process of constructing and modifying an interpretation of what the text is about, based on whatever information seems relevant at the time. (p. 29).

Listening comprehension is described as 'a process of relating input to concepts that are already active in one's memory and to familiar references in the world' (Rost, 2016, p. 49). Within semantic processing, comprehension includes the processes of knowledge structures, cognitive understanding involving the activation and modification of concepts, social understanding, inference in constructing meaning, the integration of input, problem solving and reasoning.

Of the four language skills, listening is sometimes considered the least researched and, historically, the least valued (Wilson, 2008). In foreign language teaching it is also a skill that many teachers find challenging. For teaching English as a Foreign Language (EFL), they can find valuable information on the listening process and practical guidance on employing suitable methods in line with communicative approach to teaching, respecting learners' needs, in numerous reference books (Krashen, 1982; Rixon, 1986; Vandergrift & Goh, 2012; Revell, 2013; Celce-Murcia, Brinton, & Snow, 2014; Ellis, 2015; Vandergrift & Baker, 2015; Rost, 2016; Goh & Vandergrift, 2021).

The importance of listening for language learning is also supported by empirical research. Bozorgian (2012) gives an exhausting account of valuable sources emphasizing the dominance of listening in language learning. He argues that listening is the least understood and least researched skill in language learning and is often disregarded by educators, lecturers and researchers. His study explores the relationship between listening and other languages skills, namely speaking, reading and writing in EFL in 1,800 Iranian students in International English Language Teaching system. The results provide evidence of significant correlations between listening comprehension and the other skills, as well as between listening and the overall language proficiency. He suggests that educators designing language programs should pay more attention to listening in instruction, and calls for further research on listening in foreign language learning.

His recommendation was addressed, for example, by Mayberry (2013) and Astorga-Cabezas (2015), whose empirical research findings emphasized the role of listening in the development of oral production in non-native speakers of Spanish. Similarly, the importance of studying the aural input processing on speech production in both native and foreign languages was recommended by Hulstijn (2015). Vice versa, the role of oral language skills in reading and listening comprehension was studied by Babayigit (2014), who found out that oral language, indexed by vocabulary and morphosyntactic skills, emerged as the most powerful unique predictor of both reading and listening comprehension levels in both native and foreign languages. Tschirner (2016) examined ACTFL (American Council on the Teaching of Foreign Languages) listening and reading proficiency scores from over 3,000 students studying seven languages at 21 postsecondary institutions in the US and found a consistent pattern in which listening proficiency seemed to develop more slowly in all these languages than reading proficiency. Gottardo et al. (2017) investigated the unique and shared variance of subcomponent of listening comprehension, namely the role of vocabulary, morphological awareness and syntactic knowledge in relation to reading comprehension in learners of English from Spanish-speaking backgrounds. The results showed that the three subcomponents of listening comprehension contributed to reading comprehension. Kostikova et al. (2020) examined the university students' progress in developing five language competences (listening, writing, speaking, reading and use of English) and their experiment has demonstrated that writing and listening competences are less ready to progress compared to the others.

Difficulties in Developing Listening Comprehension in a FL

Literature research indicates that listening in a foreign language is a complex process, consistently interrelated with the development of other language skills, which might present difficulties for learners. Goh (2000) offered a sound account of literature dealing with listening comprehension difficulties associated with both general and specific factors. Her research stemmed from the three-phase model of language comprehension proposed by Anderson (1995), and presented 10 problems which occurred in a group of ESL learners during the cognitive processing phases of perception, parsing and utilization. Wilson (2008) described the difficulties grouped into four general categories: characteristics of the message, the delivery, the listener and the environment.

Based on an empirical study, Andringa et al. (2012) explained individual differences in both native and non-native listening comprehension. Listening comprehension for native speakers was found to be a function of knowledge of the language and the efficiency with which one can process linguistic information, while listening comprehension for non-native speakers was a function of knowledge and reasoning ability. Working memory did not explain unique variance in listening comprehension in either group.

Vandergrift and Baker (2015) studied several learner variables in second language listening comprehension in 157 13year-old pupils in the first year of a French immersion program. The learner variables of interest included: first language (L1) listening ability, L1 vocabulary knowledge, second language (L2) vocabulary knowledge, auditory discrimination ability, metacognitive awareness of listening, and working memory capacity. Their study indicated a significant relationship among most of the variables and L2 listening ability. They concluded that auditory discrimination and working memory are initially important, leading later to more specific language skills, such as L1 and L2 use of vocabulary, in determining L2 listening comprehension.

Wang and Treffers-Daller (2017) were exploring what proportion of the variance in listening comprehension is explained by general language proficiency, vocabulary size and metacognitive awareness. Their results show that vocabulary size is the strongest predictor, followed by general language proficiency, while metacognitive awareness is less important. Their finding on the crucial impact of L2 vocabulary size on L2 listening comprehension are congruent with the results presented by Vandergrift and Baker (2015), and recent research conducted by Li and Zhang (2019), and Masrai (2021).

Peng and Wang (2019) studied the effects of the listener's language abilities, speaker's accent and adverse acoustics on listening effort of adults. Non-native listeners reported more listening effort (i.e., physical demand, temporal demand, and effort) than native listeners in speech comprehension under adverse acoustics.

Kharzhevska et al. (2019) examined three sources of difficulties in listening in university students: those connected with the listener, speaker and outer factors. They identified difficulties connected with a lack of students' knowledge about the world; insufficient communicative competence that consists of phonetic, lexical, grammatical, textual, sociocultural and functional aspects; psychological factors (inability to focus attention, listener's impatience to the interlocutor, not enough developed listening memory, low motivation); individual features of a student (individual cognitive features, age and personal interests, negative experience gained earlier while doing listening comprehension tasks); difficulties connected with incompetent selection of a recording (mismatch between the complexity of the script and the level of students' listening comprehension development: high tempo, a lot of new words, new grammar structures, dense information); and outer factors, such as the quality of the recording, low or too high volume of sound and noise interference).

Based on empirical evidence, Rost (2016) summarizes that the critical areas causing differences among individuals in language processing are attention and processing speed, processing styles, integrating processing depending on different experience of listeners, short-term memory capacity, strategic control that could be activated by the listener, and aging.

By and large, literature research reports numerous factors affecting the success in listening comprehension in a FL, as summarized, for example, by Gilakjani and Sabouri (2016). Our research aim is to find out whether we can offer an additional piece of empirical evidence that age belongs to significant factors in FL listening comprehension.

Age Factor in Language Learning and Listening Comprehension

Age is one of the variables that has been frequently researched in FL learning (e.g., Singleton, 2002;

Singleton & Ryan, 2004; Cenoz, 2002; Mayo, & Lecumberri, 2003; Nikolov & Djigunovic, 2006; Fayyaz & Kamal, 2014; Hulstijn, 2015). The main concern of age-related research is whether the age at which someone is first exposed to a FL affects learning or acquisition of that language, and whether adolescence is a critical period when the learning progress declines (DeKeyser & Larson-Hall, 2005; Vandergrift & Baker, 2015; Güvendir & Hardacre, 2018; Pei & Qin, 2019).

However, scarce are the studies at the other side of the age spectrum. Birdsong (2005) states that the decline in attained second language proficiency is not linked to maturational milestones, but persists over the age spectrum. Based on Van Den Noort et al.'s (2010) study, Rost (2016) provides an explanation for possible difficulties in FL learning from a neurolinguistic perspective.He states that 'the plasticity of neural flexibility required for language reorganization declines progressively through childhood and adolescence and may be the primary cause of some of the difficulties that adults face in second language learning' (p. 14). In other words, foreign language acquisition in adult learners might be negatively influenced by the changes in neural tissues resulting in the decline in *cognitive abilities* (the abilities allowing us to reason, plan, solve problems, think abstractly, comprehend complex ideas, learn quickly and learn from experience), such as *working memory* (the part of short-term memory which is concerned with immediate conscious perceptual and linguistic processing), or *attention*. In terms of listening comprehension in adults, age-related difficulties may also be attributed to *sensory and perceptual processes*, such as reduced *hearing* (the ability to hear sounds), *speech perception* (the process by which the sounds of language are heard, interpreted, and understood), and *phonetic discrimination* (the ability to recognize, compare and distinguish between distinct and separate sounds). Inappropriate hearing, which often progresses with age, can cause a decrease in comprehension accuracy or an increase in reaction time, even at high levels of speech intelligibility (Schneider et al., 2005; Güvendir & Hardacre, 2018). In addition, longer processing durations for participants with hearing impairment were observed, particularly for sentence structures with a higher level of linguistic complexity (Wendt et al., 2015).

The first systematic assessment of listening comprehension in a native language across the adult lifespan was provided by Sommers et al. (2011). A total of 433 participants in the age group 20—90 listened to spoken passages and answered comprehension questions. In addition, measures of auditory sensitivity were obtained from all participants to determine if hearing loss and listening comprehension changed similarly across the adult lifespan. As expected, auditory sensitivity declined from 20 to 90 years of age. However, listening comprehension remained relatively unchanged until approximately age 65—70, with declines evident only for the oldest participants. This conclusion was also confirmed by follow-up research (Sommers, 2015).

Extensive research led by Hoffman et al. (2017) shows that compared to participants aged 20 to 29 years, those aged 60 to 69 years had a 39.5 higher odds of bilateral speech-frequency hearing impairment, which means that they have trouble hearing speech clearly. Based on empirical evidence, Henry et al. (2017) state that speech comprehension decreases during healthy aging, especially when speech is fast or presented against background noise. These age-related listening and comprehension difficulties are likely the consequence of an interaction between sensory and cognitive changes.

Compared to listening in a native language, listening in a FL poses more challenges because FL listeners may have varying levels of proficiency and therefore may be more or less familiar with particular sounds and speech production patterns in that target language (Güvendir & Hardacre, 2018, p. 1). However, there are not many studies that provide evidence on the relationship between age and listening comprehension achievement in a foreign language. One of them was conducted by Seright (1985) who investigated age and aural comprehension achievement in 36 francophone military personnel learning English. Younger (aged 17 to 24 years) and older (aged 25 to 41 years) learners were compared with respect to short-term development in aural comprehension. The results showed that the achievement in L2 listening comprehension declined significantly with increasing age, given the same time span and learning conditions. On the other hand, the relationship between the achievement in L2 listening comprehension and other studied variables, namely nonverbal intelligence, education and previous English language instruction, proved to be statistically insignificant.

With regard to our research aim, we intend to take into consideration the study conducted by Russian researchers who examined the level of EL skills in university teachers at Ural Federal University at Cambridge Centre (Rasskazova & Glukhanyuk, 2017). Up to 74 faculty members underwent an EL course, and then their language skills were measured by the Cambridge English Language Assessment Exam. The results showed that the proficiency in all four skills

was lower for the age group of 45 and older, compared to the age group of 44 and younger. Listening was the least developed skill in both groups, and the difference between the means of listening scores between the age groups was the most significant of all skills. This conclusion supported our notion that there might be a negative relationship between listening comprehension achievement in a foreign language and age in adult learners.

Hypothesis

Based on literature research and our observations, our hypothesis was stated as follows: The probability of being an 'unsuccessful listener' is increasing with respect to age.

The expression 'unsuccessful listener' stems from our classification of NATO STANAG 6001 exam results that is explained below. Briefly, an 'unsuccessful listener' is a participant whose exam result falls into one of the following two categories:

- Their result in listening was assessed as the worst result of the four language skills,
- or their result in listening belonged to the worst results along with one or two other skills, i.e., one or two skills were rated better than listening.

Method

To verify the hypothesis, a comparative study using quantitative research methods was designed. Inferential statistics were employed to determine the relationship between two variables in each participant: the exam result in listening in relation to other skills and the age at the time of the examination in English. The first phase of the research compared the success in listening in three age groups tested within five academic years. The second phase focused on assessing the relationship between the listening results and the age of the participants.

Participants and Ethical Considerations

The research sample included 1,323 participants. The data consisted of five anonymized data sets gathered during the period of five consequent academic years: 2012-2013, 2013-2014, 2014-2015, 2015-2016 and 2016-2017 at the LC, UoD. The data contained the participants' date of birth and their results in the NATO STANAG 6001 Examination (BILC, 2001[1]) described below. The data were collected and processed only to the extent and for the duration strictly necessary for the research. Unfortunately, it was impossible to obtain the data on age over the latest years due to the implementation of the General Data Protection Regulation (GDPR) on 25 May 2018.

Most of the participants took the NATO STANAG 6001 Examination upon completion of an English language course at the LC. The majority of them were military personnel and some of them were civilian employees working for the Ministry of Defense in the Czech Republic, e.g., faculty members of the UoD. The representation of gender, ranks or carrier profiles was not examined. The research sample was divided according to the participants' age at the time of their examination in English into three age groups (AG): 21—30, 31—40 and 41—60, as shown in Table 1. The reason why the last AG 41—60 is wider than the other ones is that the number of participants at the age of 41+ is relatively small.

Materials and Measuring Instruments

NATO STANAG 6001 Examination and SLP

The research sample was assessed by the NATO STANAG 6001 Examination, which is used for various high-stakes purposes, such as employment and deployment decisions, promotions, or participation in various courses. Each NATO STANAG 6001 Examination result, Standardized Proficiency Level (SLP), is expressed as a sequence of levels in listening, speaking, reading and writing, respectively. The levels for all skills are defined by NATO descriptors. The

Table 1

Representation of the Age Groups Tested over the Period of Five Academic Years.

AG	*2012-2013* *n*	*2013-2014* *n*	*2014-2015* *n*	*2015-2016* *n*	*2016-2017* *n*	*Total* *n*	*Total* *ptc*
21—30	98	47	100	87	21	276	20.86
31—40	198	130	287	87	30	732	50.33
41—60	94	61	101	39	20	315	23.81
Total	**390**	**238**	**488**	**147**	**60**	**1323**	**100.00**

Note: AG = age group, n = number of participants, ptc = percentage of participants.

[1] BILC (2021). http://www.natobilc.org/en

levels that can be obtained at the LC, UoD, are as follows:

- 0 – No proficiency
- 1 –Survival
- 1+ –Survival +
- 2 – Functional
- 2+ –Functional +
- 3 – Professional

'A plus level substantially exceeds the base level, but does not fully or consistently meet all of the criteria for the next higher base level.' (BILC, 2020).

The exam was aimed at testing SLP at levels 1, 2 and 3. The listening part of the exam in the years 2012—2017 consisted of a paper-and-pencil test of 30 multiple-choice questions. The information on the test, including some sample questions, is presented at the UoD website[2].

Classification Scale Determining the Success in Listening in EFL

The purpose of this classification scale was to eliminate the impact of overall proficiency level on listening comprehension. Our intention was to find out whether there was a relationship between success in listening with regard to other language skills and age. Therefore, the exam results of participants were divided into six success categories according to the classification scale we proposed. Listening skill is in the first place in the sequence of the levels of other language skills.

1. Listening was rated as the best result of all four skills; e.g., SLP 322+2.
2. Listening was part of the best results together with one or two other skills, i.e., one or two other skills were rated worse than listening; e.g., SLP 3232+.
3. Listening was rated the same as the other three skills; e.g., SLP 3333.
4. At least one skill was rated better than listening, and at least one skill was rated worse than listening; e.g., SLP 2+232+.
5. Listening was part of the worst results together with one or two other skills, i.e. one or two other skills were rated better than listening; e.g., SLP 2232+.
6. Listening was rated as the worst result of all four skills; e.g., SLP 2332+.

Since the research focused on identifying the results in listening which did not meet the required level, and, at the same time, were surpassed by other language skills, the percentage of each of the three age groups falling into categories 5 and 6 became the main point of interest. For the purpose of this article, the participants falling into categories 5 and 6 are referred to as 'unsuccessful listeners'. All other participants are considered 'successful listeners'.

Research Procedure

The data analysis procedure was divided into two phases. In the first phase of the research, the participants (n = 1,323) were divided into the age groups (Table 1). Then the numbers and percentage of 'unsuccessful listeners' in each academic year for each group were calculated (Table 2). After that the results were compared by graphical representation for each academic year (Figure 1), and then for the age groups tested during all five academic years (Figure 2).

In the second phase of the research a reduced research sample (n = 1,296) was used for calculating the proportion of 'unsuccessful listeners' for each year of age separately (Table 4). The results are represented by a regression model (Figure 3).

Statistical Analysis

In the first phase of the research, the analysis of variance (ANOVA) was conducted to compare the effect of the age group on the percentage of the 'unsuccessful listeners'.

In the second phase of the research, a generalized linear model was used to assess the relationship between the listening results (i.e., being or not being an 'unsuccessful listener') and the age of the participants.

The results were computed by R, version 3.5.1 (R Core Team, 2019[3]). ANOVA and post hoc Tukey's honest significant test were applied in the first phase of the research. In the second one, the logistic regression with maximum likelihood estimates and odds ratio estimates were computed.

Results

Outcome 1. The First Phase of the Research

Given the objective of the research and the

[2] www.unob.cz

[3] R Core Team (2019). R: A language and environment for statistical computing. R Foundation for Statistical Computing, Vienna, Austria. https://www.R-project.org

representation of the age groups in the research sample, the authors decided to compare the percentage representation of the sums of items falling into the 5th and 6th success categories, the 'unsuccessful listeners', for the age groups 21—30, 31—40 and 41—60 within the period of five years. The numbers and percentages of the 'unsuccessful listeners' are summarized in Table 2. The results are plotted on the graph in Figure 1, showing the percentages of 'unsuccessful listeners', tested within the period of five years.

Table 2

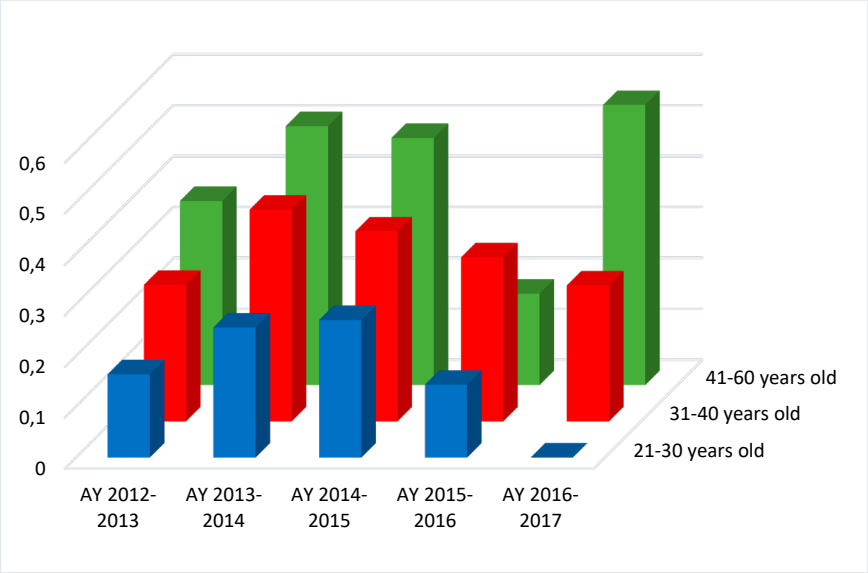
Overview of the Numbers and Percentages of 'Unsuccessful Listeners' Tested over the Period of Five Academic Years.

AG of UL	*2012-2013*		*2013-2014*		*2014-2015*		*2015-2016*		*2016-2017*		*Total*	
	n	***ptc***	***n***	***ptc***	***n***	***ptc***	***n***	***ptc***	***n***	***ptc***	***n***	***ptc***
21—30	16	16.33	12	25.53	27	27.00	3	14.29	0	0.00	58	21.01
31—40	53	26.77	54	41.53	107	37.28	28	32.18	8	26.67	250	34.15
41—60	34	36.17	31	50.82	49	48.51	7	17.95	11	55.00	132	41.90
Total	**103**	**26.41**	**97**	**40.76**	**183**	**37.50**	**38**	**25.85**	**19**	**31.67**	**440**	**33.26**

Note: AG = age group, UL = 'unsuccessful listeners', n = number of participants, ptc = percentage of participants.

Figure 1

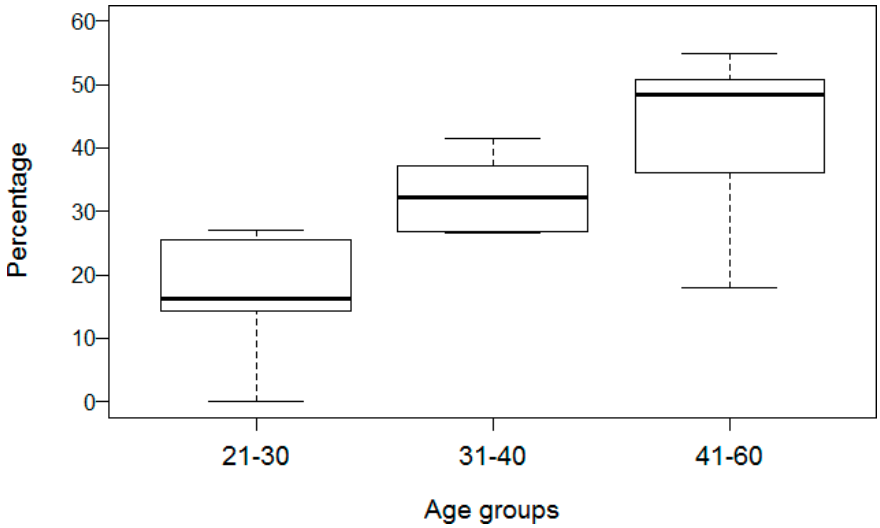
Percentages of 'Unsuccessful Listeners' in the NATO STANAG 6001 Examinations for the Three Specified Age Groups Tested in the Academic Years from 2012-2013 to 2016-2017.



Note: AY = academic year

Figure 2

Boxplots of Percentages of 'Unsuccessful Listeners' in the NATO STANAG 6001 Examinations for Three Specified Age Groups Tested in the Academic Years from 2012-2013 to 2016-2017.



The analysis of variance, illustrated by boxplots in Figure 3, revealed that the effect of the age group was significant at $p < .05$ for the three age groups [$F(2, 12) = 6.30$, $p = .014$]. Post hoc analyses using the Tukey's HSD method found that the mean value of the percentage for the age group 41—60 ($M = 41.69$, $SD = 15.01$) was significantly different than the percentage of the age group 21—30 ($M = 16.63$, $SD = 10.83$). However, the age group 31—40 ($M = 32.89$, $SD = 6.53$) did not significantly differ from the other two age groups.

These results suggest that age has an effect on listening comprehension in a foreign language. Specifically, the younger listeners have better results in listening than the older ones (see Figures 1 and 2). However, it must be noted that the difference in age must be large, in our case it makes more than 10 years.

Outcome 2. The Second Phase of the Research

For further research focusing on the decrease in listening comprehension achievement in relation to age, the original research sample was reduced due to the insufficient number of participants younger than 25 and older than 52 years. So, the new research sample included the results of 'unsuccessful listeners' from the age of 25 to 52. It consisted of 1,296 participants whose examination results were collected over 5 academic years, from 2012-2013 to 2016-2017. The data were analyzed in detail with regard to each year of age. The results are presented in Table 3.

The logistic regression analysis resulted in the model equation

$$\pi(x) = [1 + \exp(2.65 - 0.05 \cdot x)]^{-1}.$$

The predictor variable, age, in the regression analysis contributes to the model ($\chi^2(1) = 30.86$, $p < .001$). Both parameters $b_0 = -2.65$ ($SE = 0.36$, $p < .001$) and $b_1 = 0.05$ ($SE = 0.01$, $p < .001$) are statistically significant at $p < .05$. Figure 3 presents a graphical form of the obtained regression function.

The estimated odds ratio favored an increase of nearly 6% ($\exp(b_0) = 1.056$, 95% CI = [1.036, 1.076]) for being an 'unsuccessful listener' every one year of the age.

The regression curve shows that there is a gradual increase in the percentage of 'unsuccessful listeners' in relation to age. In other words, there is a gradual decline in the success in listening comprehension in comparison with learners' other language skills in relation to increasing age.

Table 3

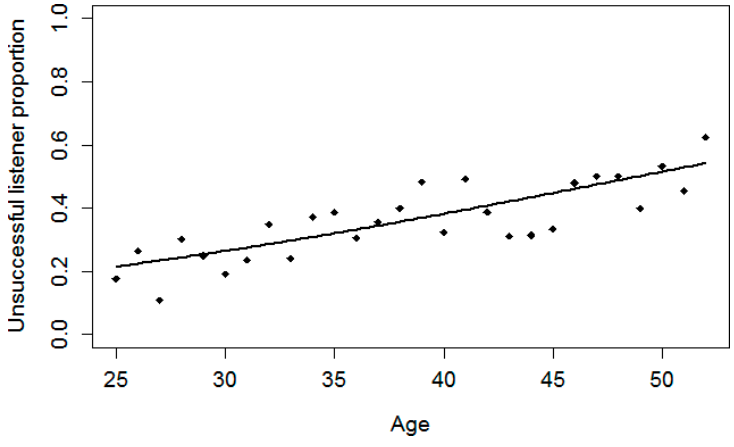
Review of 'Unsuccessful Listeners' of the Age of 25–52 (n = 1,296) Tested in the Academic Years from 2012-2013 to 2016-2017.

Age	*Participants total n*	*Group 5 n*	*Group 6 n*	*Groups 5 + 6 n*	*Groups 5 + 6 ptc*
25	17	1	2	3	17.65
26	34	8	1	9	26.47
27	37	4	0	4	10.81
28	33	6	4	10	30.30
29	52	8	5	13	25.00
30	89	10	7	17	19.10
31	72	12	5	17	23.61
32	86	28	2	30	34.88
33	95	18	5	23	24.21
34	94	27	8	35	37.23
35	93	27	9	36	38.71
36	75	17	6	23	30.67
37	59	16	5	21	35.59
38	65	21	5	26	40.00
39	56	20	7	27	48.21
40	37	10	2	12	32.43
41	59	22	7	29	49.15
42	49	14	5	19	38.78
43	32	9	1	10	31.25
44	35	5	6	11	31.43
45	30	6	4	10	33.33
46	25	8	4	12	48.00
47	12	5	1	6	50.00
48	16	4	4	8	50.00
49	10	2	2	4	40.00
50	15	4	4	8	53.33
51	11	5	0	5	45.45
52	8	3	2	5	62.50

Note: n = number of participants, ptc = percentage of participants.

Figure 3

'Unsuccessful Listener' Proportion in Relation to the Age of the Participants Tested in the Academic Years from 2012-2013 to 2016-2017 Fitted with the Logistic Regression Curve.



Discussion

The outcomes identifying the differences between three age groups indicate that the age group 21—30 shows better results in listening than older groups in the course of five academic years, as illustrated in Figure 1. The analysis of variance with post hoc Tukey's HSD test has proved that the age group 21—30 gained significantly better results in listening than the age group 41—60 at the 5% significance level. In addition to that, the logistic regression curve (Figure 3) has shown that there was a gradual increase in the percentage of 'unsuccessful listeners' in relation to age. Specifically, the difference of one year between participants' age changes the odds of 'unsuccessfulness' 1.06 times and the ten years difference in participants' age will result in **1.7**2 times higher odds of being an 'unsuccessful listener'. Thus, our hypothesis that the probability of being an 'unsuccessful listener' is increasing with respect to age has been verified.

Our findings are congruent with Seright's (1985) results showing that the achievement in L2 listening comprehension declines significantly with increasing age. The fact that learners over 40 experience more difficulties in listening than younger learners was also supported by the study conducted by Rasskazova and Glukhanyuk (2017) that revealed that university lecturers older than 45 years old had achieved significantly worse results in Cambridge Exam in listening than their younger colleagues. In addition, our finding is in accordance with one of our previous studies concerning the UoD students (age group 19—24) that showed that of the four language skills, listening was not the one worst rated, as it was exceeded by writing and speaking (Hruby & Stankova, 2020). Thus, our findings offer an additional piece of empirical evidence that there is a negative correlation between the success in listening comprehension in a foreign language and age, as implied by other researchers (Hulstijn, 2015; Rost, 2016; Henry et al. (2017). Unfortunately, to our knowledge, there have been no recent studies examining the relationship between listening comprehension in a FL and age in adults to which our findings could be compared.

We believe that the most probable causes of the decline in listening comprehension ability with age are worse cognitive, sensory and perceptual processes in comparison with young adults, although we are aware of the fact that Sommers et al. (2011) and Sommers (2015) reported that in their research sample listening comprehension in a native language remained relatively unchanged until AG 65—70. Nevertheless, it is very probable that listening in a FL might cause more difficulties, since FL listeners are less often exposed to different types of listening materials or may be less familiar with particular sounds and speech production patterns in that FL than in their native language, as implied by Schneider et al. (2005), Güvendir and Hardacre (2018), and Peng and Wang, (2019). Thus, we dare to speculate that the deterioration in listening comprehension abilities in relation to age might be more progressive in a FL than in a native language.

We are aware of the limitations of the study caused mainly by the insufficient number of results from learners over 46 years old. In general, it is quite rare for people over 46 to undergo testing in a foreign language, as most employees have to comply with language requirements in the earlier stages of their career. So, this lack of data reflects the reality, and it will be difficult to gain a large amount of them even in the future. Moreover, the GDPR that aims primarily to give control to individuals over their personal data makes gathering data for such research more demanding.We suggest that this situation could be overcome in future by closer collaboration with learners, e.g., by interviews focusing on gathering quantitative and qualitative data for further research with their consent.

Recommendations

Both educators and learners should be aware of the finding, implying that some middle-aged and older learners need to put on a great deal of effort to become successful listeners. Our opinions on assisting the learners are in line with the latest research that emphasizes the importance of developing knowledge, skills and strategies that can facilitate cognitive and social process in comprehension. For example, Celce-Murcia et al. (2014) offer numerous valuable suggestions on incorporating metacognitive activities, based on thinking about the ways one processes or uses language, into task-based instruction. Rost (2016) lists and explains some strategies that could be employed in semantic processing, such as construction integration based on previous knowledge, listener integration of input, reasoning and problem solving during listening comprehension. Given natural limitations of memory and fluctuations of attention, employing some compensatory strategies may be required, such as skipping, approximation, filtering, incompletion and substitution (p. 62). Moreover, in real life 'the listeners can intuit the meaning through the connection to the speaker, the events, and their inner worlds and through their intention to understand' (Rost, 2016, p. 64).

In terms of improving listening comprehension, our opinion is congruent with Rost's (2016) suggestions on a balanced method, which should include the following elements: rich input, collaborative tasks, pushed output in speaking and writing practicing what learners have understood, opportunities for noticing and practicing new language, and maximizing long-term motivation and commitment to learning. Educators should carefully select listening materials and employ listening tasks to meet courses objectives. For example, Gilakjani and Sabouri (2016) provide numerous practical recommendations on implementing listening activities, and emphasize the importance of educators' approach to facilitating them.Course designers and planners should keep in mind that middle-aged learners might need some time to develop metacognitive awareness and improve their strategies in listening comprehension through various tasks (Buck, 2001; Wilson, 2008; Graham & Santos 2015; Rost, 2016; Goh, 2018; Goh & Vandergrift, 2021). Appropriate listening sources for self-study should be recommended to learners, such as specialized listening course-books and e-learning listening courses, as well as advice for developing listening strategies, as suggested by Celce-Murcia et al. (2014) and Dalman and Plonsky (2022). Additionally, educators should apply to instruction the findings from recent studies that offer empirical evidence on positive impacts of various factors on listening comprehension in a FL, such as knowledge of vocabulary (Li & Zhang, 2019; Masrai, 2021), appropriate learning context (Yu, Janse, & Schoonen, 2021), linguistic knowledge (Kim, Nam, & Crossley, 2022), and the strength of cross-language interdependence (Sierens et al., 2021).

Finally, and most importantly, based on the findings of the study, we recommend that middle aged and older learners should be notified that their development in listening comprehension can be the most demanding part in their preparation for language examinations. It might be comforting for them to learn that non-verbal intelligence does not play a significant role in the success in listening comprehension, as suggested by Seright (1985). This realization might reduce anxiety and tension in taking listening tests. Nevertheless, these learners should anticipate possible difficulties and monitor their listening development in a FL vigilantly.

Conclusion

Listening in a foreign language has been one of the least explored skills in previous research. Understanding how age affects listening comprehension is one of the crucial issues in foreign language learning and acquisition. This study offers an additional piece of empirical evidence that there is a negative correlation between the success in listening comprehension in a foreign language and age.

A total of 1,323 high-stake test results in English as a Foreign Language gained by Czech adults were processed in order to verify the hypothesis that age negatively affects the success in listening comprehension. The exam results were classified to determine 'unsuccessful listeners' in relation to other language skills — speaking, reading and writing. Analysis of variance has shown that the age group 21—30 gained significantly better results in listening than the age group 41—60 at the 5% significance level. In addition to that, the logistic regression curve has illustrated a gradual increase in the percentage of 'unsuccessful listeners' aged 25—52 in relation to age.

The findings of our study resonate with research implying the decline in listening comprehension ability in a foreign language with age. Therefore, middle-aged learners and their educators should anticipate problems in listening comprehension and channel their efforts to adopt suitable learning strategies, teaching methods and appropriate curricula to overcome them.

More studies on the relationship between listening comprehension and age in native, second and other foreign languages in different countries are needed to generalize our findings. Further research should consider cognitive, metacognitive and social factors affecting listening comprehension, as well as personal characteristics of the listeners of different ages, such as their motivation, attitude to listening and their hearing condition.

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Declaration of Competing Interest

None declared.

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