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Miroslava Melicherčíková & Soňa Hodáková

Interpreters' ability to cope with interference compared with the length of their professional experience

Abstract

The aim of this paper is to find out whether professional interpreters, compared to interpreting students and the general population, excel in their ability to deal with interference and whether this ability correlates with their length of experience or age. The results show that the ability to deal with interference, as measured by the Stroop test, was relatively high in all the research groups, i. e., among both interpreting students and professional interpreters with shorter and longer experience. All groups scored on average higher than the general population. The highest scores were achieved by junior interpreters. The senior interpreters scored relatively high, but the lowest of the study groups. The results confirm their good ability to handle interference in cognitive tasks, but may also indicate the effect of cognitive aging. Due to the small number of research subjects, the findings cannot be generalized.

1 Introduction

Interpreters are often assumed to have certain specific, exceptional skills, such as better memory (Van der Linden et al. 2018). As Hodzik and Williams (2021) state, there are reasons to believe that interpreters' executive functions may be particularly well developed. Executive skills include the ability to keep selected information active despite distractions or interfering stimuli. Interpreters also have to selectively choose the information from the source language that they are interpreting, which again places demands on the executive system (Hodzik/Williams 2021). In this context, Yudes, Macizo and Bajo (2011) refer to simultaneous interpreters as "experts in executive control".

The executive system consists of several subprocesses, the three most frequently referred to being inhibition (including response inhibition and interference suppression), mental set shifting (task switching or cognitive flexibility), and information updating and monitoring in working memory (Miyake et al. 2000). These processes can be operationalized using specific (non-linguistic) tasks to investigate interpreters' executive functions (Hodzik/Williams 2021). A number of studies are available that have compared the executive functions of professional interpreters on the one hand and professional translators, interpreting students, foreign language teachers, monolinguals and bilinguals on the other (e. g. Köpke/Nespoulous 2006; Yudes/Macizo/Bajo 2011; Morales et

al. 2015; Woumans et al. 2015; Dong/Liu 2016; Aparicio/Heidlmayr/Isel 2017; Henrard/Van Daele 2017; Van der Linden et al. 2018; Rosiers et al. 2019). Results of the study by Köpke and Nespoulous (2006) confirm the idea that "novice" and "expert" processing are different. Yudes, Macizo and Bajo (2011) claim that interpreting experience is associated with changes in the control processes required to perform complex interpreting tasks.

However, as we document in the next section, the research conducted to date does not offer a clear answer to the question of interpreters' specific cognitive advantages. Therefore, the main aim of the present paper is to find out whether professional interpreters, compared to interpreting students and the general population, are superior in their ability to cope with interference and whether this skill changes in relation to the length of their experience or their age.

2 Literature review

As mentioned above, several studies are available that have compared the executive functions of professional interpreters and other selected groups. In relation to the topic of this paper, we will focus in particular on studies that have investigated (often together with other aspects) what is known as conflict resolution in interpreting (Van der Linden et al. 2018).

Two types of conflict resolution are relevant in the interpreting process: resistance to interference and prepotent response inhibition. Resistance to interference is "a type of conflict resolution that allows an individual to focus on the task at hand and to avoid distraction from irrelevant information" (Van der Linden et al. 2018: 5). The second type of conflict resolution, prepotent response inhibition, is related to the fact that automatic responses caused by routines (automatized behaviors) are not always desirable and, when undesirable, should be prevented (Van der Linden et al. 2018). Friedman and Miyake (2004) point out that the meanings of the terms inhibition and interference suppression[1] are broad and scholars do not use them consistently. Although they differ from each other, they are often used synonymously in the literature. A rather clear distinction is provided by MacLeod et al. (2003), who describe interference as an effect or phenomenon, while inhibition refers to a mechanism or explanation of an effect.

We begin our review of interpreting research on conflict resolution with Köpke and Nespoulous's (2006) extensive research on the working memory of professional interpreters (experts), second-year interpreting students (novices), and two control groups (bi/multilingual individuals with no interpreting experience and students with no particular foreign language competence). The tests applied included several cognitive

[1] According to Wilson and Kipp (1998), inhibition is an active process of suppression that acts on the working memory contents, whereas interference resistance is a mechanism that prevents irrelevant information or interfering stimuli from entering the working memory. At the same time, however, Wilson and Kipp acknowledge their interconnection.

tasks. The authors of the study found no differences between groups on the simple span tasks and selective attention (inhibition as conflict resolution) measured by the Stroop test. Significant differences between the interpreters (professionals, novices) and the controls were seen in complex tasks (free recall with articulatory suppression, category probe task and listening span task) that required the use of semantic strategies from central executive processing. Despite expectations, the interpreting students (novices) scored better in general than the professional interpreters (experts). The researchers attributed the difference in performance between the novice and professional interpreters to differences in age, screening processes, and memory training. The results of this study, as Köpke and Nespoulous (2006) state, support the idea that "novice" and "expert" processing are fundamentally different, similar to what Moser-Mercer (2000) argues. Working memory capacity is more likely to develop among novices, whereas among experienced interpreters, other types of processes may develop which may replace particular working memory processes (Köpke/Nespoulous 2006). The researchers also attribute the lack of differences between the groups to the research tools used. For example, in the case of investigating selective attention, they suggest that the comparable performance of professional interpreters may have been caused by the research instrument itself, namely its reduced validity in measuring attention in simultaneous interpreting. The researchers consider the visual nature of the Stroop test to be in contrast to the predominantly auditory material in simultaneous interpreting (Köpke/Nespoulous 2006).

The nonverbal executive processes of professional interpreters, bilingual subjects without interpreting training, and a control group of monolingual subjects were compared by Yudes, Macizo and Bajo (2011). The researchers examined the executive processes of cognitive flexibility (using the Wisconsin card sorting test/WCST) and inhibition/interference suppression (using the Simon Task[2]). The results indicated that simultaneous interpreters performed better than bilinguals and monolinguals on measures of cognitive flexibility as they showed fewer attempts at inferring a new rule, few errors, and few perseverations (persisting with the application of an incorrectly inferred principle). Thus, overall, they were cognitively more flexible compared to the other two groups. Conversely, on inhibitory processes, the simultaneous interpreters scored similarly to the bilinguals and monolinguals. That is, there were no differences between the groups in conflict resolution. These results suggest that interpreting expertise is associated with changes in the control processes required to perform interpreting tasks (Yudes/Macizo/Bajo 2011).

Similarly, Morales et al. (2015) found no group differences in conflict resolution when comparing professional interpreters and highly proficient bilinguals (non-interpreters), thus reaching similar findings to two previous studies (Köpke/Nespoulous 2006; Yudes/Macizo/Bajo 2011). However, differences in favor of interpreters were observed in another executive function, namely skill updating. Overall, the results of this study suggest that experience in simultaneous interpreting transfers to other domains;

[2] Conceptually similar to the Stroop test.

however, this transfer seems to be specific only to cognitive processes that are more closely related to interpreting tasks (Morales et al. 2015). That resonates with previous research on expertise showing that expertise only improves particular expertise-related behaviour, but not broad executive skills (Krampe/Ericsson 1996).

Inhibition, specifically active inhibition of competing representations and overcoming inhibition in simultaneous interpreters and bilinguals, was investigated by Aparicio, Heidlmayr and Isel (2017). The aim of their study was to compare how the two selected groups perform executive tasks involving specific inhibitory processes. In doing so, the researchers assumed that simultaneous interpreters and highly proficient bilinguals differ in language control capacity. The Stroop test, examining interference suppression, i. e. active inhibition only, showed similar results for both groups, which, according to the researchers, indicates that active inhibition may function similarly in both groups (Aparicio/Heidlmayr/Isel 2017). However, the researchers arrived at different findings when examining the overcoming of inhibition, where better scores were achieved by highly proficient bilinguals. Aparicio, Heidlmayr and Isel (2017) propose that overcoming inhibition requires more cognitive resources than those required for simultaneous interpreting. Overall, these data imply that some executive control processes may be less sensitive to the degree of expertise in bilingual language proficiency (Aparicio/ Heidlmayr/Isel 2017).

Another extensive study, which investigated the cognitive performance of professional interpreters through multiple tasks and compared it with the cognitive performance of monolinguals and foreign language teachers, was conducted by Van der Linden et al. (2018). The results showed that professional interpreters scored similarly to both monolinguals and foreign language teachers on all cognitive tasks (including conflict resolution). Similarly to several previous studies, Van der Linden et al. (2018) suggest in their study that interpreter experience does not necessarily lead to general cognitive control benefits. However, interpreters may have some advantages in short-term memory, suggesting that this could be an important aspect of cognitive control in simultaneous interpreting.

The studies mentioned in the previous section compared professional interpreters with bilinguals, monolinguals, interpreting students or foreign language teachers. Research on a sample of students only was conducted by Shaw (2011). In a comparative study, she investigated selected cognitive and personality (motivational) aspects of student interpreters. The sample was differentiated into novice and advanced students on the one hand, and conference and sign-language-interpreting students on the other. The neurocognitive test battery included a computerized version of the Stroop test measuring attentional flexibility/inhibitory control.[3] For this aspect, Shaw found no differences between the groups examined. That is, the performances of novice and advanced students as well as the performances of conference and sign-language-interpreting stu-

[3] Scarpina and Tagini (2017) similarly report that the Stroop test measures multiple cognitive aspects. However, we suspect that for some of them it may not be sensitive enough. For example, for cognitive flexibility, the WCST provides much more detailed data across multiple categories.

dents were very similar and comparable (Shaw 2011). However, significant differences were indicated for visual memory, which is related to the specifics of sign-language interpreting compared to conference interpreting. The almost equal level of attentional flexibility/inhibitory control in all groups may be related to the similarity of interpreting training programs across countries, the similar age and the predominantly female gender of the respondents. These findings are in line with relevant findings of previous research and suggest advantages of more experienced interpreters in domains which are closely linked to interpreting.

The potential impact of enrolment in specific courses on cognitive abilities (inhibition, switching, updating and monitoring) was investigated by Dong and Liu (2016). Their research sample consisted of unbalanced bilinguals who had not received any interpreting or translation training before testing, but had enrolled in translation and interpreting courses or general English courses during the testing. The researchers examined inhibitory control using the Stroop test with numbers, with the assumption that smaller interference effects would reflect better control. They deliberately did not choose instruments used in previous studies (Simon task, Flanker task, color Stroop test) because they considered them too simple for the research sample (young students at the peak of their cognitive abilities). The results of the Stroop test with numbers showed no advantage in inhibitory control for students with interpreting or translating experience (Dong/Liu 2016). However, they demonstrated that interpreting experience yielded significant cognitive benefits for switching and updating, whereas translating experience yielded a moderately significant improvement in updating. To explain the results, Dong and Liu (2016) believe that there may be a developmental trajectory of cognitive control improvement in multitasking training such as interpreting training. At the beginning of training, this trajectory rises, albeit slowly but steadily, and at a certain point, when participants reach a cognitive peak, the curve begins to flatten out. Subsequently, the trajectory may begin to slowly decline as the training becomes less demanding and participants become more skilled and more automatic at the task. In other words, a skill that requires a great deal of controlled processing may help improve cognitive control functions in the early stages, but when the skill becomes automatic and requires much less controlled processing, the initial benefits cease to be apparent. As Dong and Liu (2016) add, more empirical studies, for instance longitudinal studies with better controlled designs and using other experimental methods such as fMRI, may help to verify these hypotheses.

Similarly, a study by Rosiers et al. (2019) focused solely on students. The researchers examined the working memory capacity and executive functions (inhibition, switching and updating) of a group of interpreting students, which they compared with two other groups of advanced language users. The results showed only negligible differences between the three groups at the beginning of their master's studies. Thus, the assumed cognitive advantage of novice interpreters was not found for executive control.

Much of the previous interpreting research has not demonstrated a cognitive advantage for professional interpreters or student interpreters on the selected executive function, namely conflict resolution (inhibition, interference suppression), compared to

other groups. However, there is also research that confirms this advantage. For example, Woumans et al. (2015) investigated the relationship between language control and non-verbal cognitive control in selected groups of monolinguals, unbalanced and balanced bilinguals, and interpreting students. In comparing the groups, the researchers used the Simon task (as in Yudes/Macizo/Bajo 2011) along with the attention network test. All three bilingual groups showed a smaller congruency effect than the monolingual group in the Simon task, indicating an advantage for these groups. The bilingual groups were also faster at the attention network test. In addition, the interpreting students outperformed the unbalanced – but not the balanced – bilinguals in terms of overall accuracy in both tasks. Thus, the study's findings support the existence of a bilingual advantage and also suggest that different patterns of bilingual language use modulate the cognitive control advantage (its nature and extent) in a multilingual population (Woumans et al. 2015).

Similar findings were reached by Henrard and Van Daele (2017), who examined the relationship between simultaneous interpreting and some aspects of executive control. In doing so, they compared three relatively large, equally sized groups of interpreters, translators, and monolinguals on five computer-based tasks designed to assess different executive processes as well as information-processing speed. The results showed that interpreters scored better than monolinguals on all tasks and also scored better than translators on almost all tasks (flexibility being the exception). The research further indicated that the variable of age did not have the same effect on interpreters' and translators' performance in some tasks (updating, flexibility, and resistance to proactive inhibition), or only on interpreters' performance (information processing speed and prepotent response inhibition). In addition to bilingualism being an advantage in some aspects of executive control, the results of the study suggested that another advantage of interpreters is conditioned by the characteristics of their work activity (especially intense time pressure) and the extent of their experience in this activity (Henrard/Van Daele 2017).

A series of longitudinal research studies conducted on sign language interpreters (Macnamara/Conway 2016) also provides very valuable findings on the subject. The researchers attempted to find answers to the question of how working memory capacity, performance in simultaneous interpreting, and length of interpreter training are related to each other. Data analysis revealed that both types of working memory capacity – information retention and interference resistance as well as coordination and transformation – were important predictors of performance in simultaneous interpreting, both at the beginning and at the end of interpreter training. The researchers also noted improvements in mental flexibility, psychomotor and perceptual speed, fluid intelligence, speed of switching between tasks, and the ability to coordinate and transform information in working memory during the interpreter training process. However, they did not find improvements in the ability to hold information active in the working memory or in the ability to resist interference. Overall, the researchers concluded that performance on both simultaneous interpreting and cognitive tasks increased with training length. At the same

time, according to the researchers, both cognitive performance and performance in simultaneous interpreting effectively predicted students' performance at the end of training, with working memory capacity being a strong predictor of performance in simultaneous interpreting, especially at the end of interpreter training. They also found that students who performed poorly at the beginning improved more rapidly during the training process compared to students who excelled in cognitive performance at the beginning (Macnamara/Conway 2016). Their findings demonstrate the importance of cognitive predispositions as well as effective training in shaping interpreting competence. However, they also point to a reciprocal effect of interpreter training and mental equipment, as it is evident that some cognitive characteristics improve with increasing interpreting practice. The fact that there was no substantial improvement in the ability to cope with interference during training (Macnamara/Conway 2016) can also be explained by the influence of more stable personality characteristics (e. g. cognitive style or temperament). It is also plausible to assume that the ability to handle interference is part of an interpreter's expertise, which is developed through long-term, intensive, and focused training beyond automatized processes (Hodáková 2022).

The above brief review of research on selected cognitive skills of interpreters or interpreting students in comparison with other populations suggests that the results obtained from such research are not always consistent. The variability in the findings amongst others lies in the differences between the methods used as well as between the research samples. For instance, sometimes the word "interpreters" is used to refer to interpreting students as opposed to professional interpreters with several years of experience. Also, the training of interpreting students varies from country to country. Variation is also typical for the control groups. All these aspects codetermine the current status of the issue under study. In general, it can be said that for the easier tasks (including conflict resolution), significant differences between interpreters and the other groups were not observed in most cases, while by contrast, for the more difficult tasks specific to interpreting (e. g. cognitive flexibility), interpreters scored higher.

3 Materials and methods

Automation is often desirable in interpreting because it helps interpreters save cognitive resources. However, there are situations where automation is disadvantageous. These are particularly tasks in which there are stimuli that trigger an automatic response, which, however, is in contradiction with the task assignment, which requires that the triggered automatic response be stopped. One method of measuring this interference is the Stroop test.

The Stroop test has long been one of the most widely used neuropsychological assessment tools (Lezak et al. 2012). In addition to its use in clinical practice, it is also used in research to investigate processes of selective attention and executive functions (Krivá 2013). Scarpina and Tagini (2017) confirm that apart from measuring the ability to inhibit cognitive interference, the literature mentions its use for measuring multiple

cognitive functions such as attention, processing speed, cognitive flexibility, and working memory.

Administering the test typically takes approximately 5 minutes, making it a useful screening tool that can be used on its own or as part of a larger screening battery (Golden/Freshwater/Golden 2002), as was the case in our research. We used the Stroop test in combination with other tests of personality, motivation, cognitive flexibility, and anxiety, as well as a test of simultaneous interpreting performance.

In our research we worked with the first Czech version (Krivá 2013). The administration instructions correspond to commonly used instructions (Golden/Freshwater/Golden 2002). The test booklet consists of three A4 sheets corresponding to the three parts of the test: the Word subtest (W), the Color subtest (C) and the Color-Word subtest (CW). Each sheet contains 100 items on a white background, which are evenly arranged in five columns. In the first Word subtest (W), the names of three colors are printed in black ink. In the second Color subtest (C) the symbols (x) are printed in colored ink, and the three colors used are the ones whose names appeared in the first task. The third Color-Word subtest (CW) includes the color names from the first subtest (in the same order) printed in the colors from the second subtest (in the same order); however, the word and the color do not match (Golden/Freshwater/Golden 2002; Krivá 2013: 13). We administered the test individually.

The subjects' task was to read as many words as possible in the Word subtest and to name as many colors as possible in the Color and Word-Color subtests within a given time limit (45 seconds). By evaluating the Stroop test, we obtained the basic raw scores for words (W), colors (C), color-words (CW), the predicted raw scores for color-words (CW'), and interference scores (IF). Incorrect answers are not scored in this test, as the subject is warned that he/she has made a mistake and has to correct it, which leads to a reduction of the raw score in the given subtest (Krivá 2013). The basic raw score represents the number of items read correctly within a specified time limit. The interference raw score represents the difference between the raw score on the CW subtest and the predicted raw score on that subtest. The faster the subject (correctly) answers the CW subtest, the higher the IF. In addition to contextualizing the results from the Stroop test with data from other tests, in this particular case we tried to find out whether interpreters, compared to interpreting students and the general population, excel in their ability to deal with interference and whether this ability changes with their length of experience (i. e. the acquisition of expertise) or age.

3.1 Participants

Due to the specificity of the research sample, we opted for convenience sampling. Our aim was to draw a sample of professional interpreters and interpreting students. The basic condition for the professional interpreters was that they were actively engaged in the profession and interpreted regularly (on average a total of at least one working day per month). Since the research also focused on possible differences that may be related to the length of experience or expertise, part of the research sample was also to be made

up of professionals with at least 10 years of continuous interpreting experience. One of the members of the research team approached interpreters who met the required criteria through his network of contacts and professional associations. A financial reward was offered for participation in the research.

The students were supposed to be second-year (i. e. final-year) students of the master's program in Translation and Interpreting, as they had already received most of their theoretical and practical training during their university education. At the same time, they were supposed to be students who were inclined towards interpreting and wanted to pursue it professionally in the future.[4]

In the end, nine of the professional interpreters contacted agreed to participate in the research.[5] The characteristics of the participants were obtained from individual semi-structured interviews conducted by another member of the research team. The research sample consisted of a total of 6 women and 3 men. The average age of the professional interpreters was 38.4 years, with the youngest being 28 years old at the time of the interviews and the oldest being 54 years old. For all participants, Slovak was their mother tongue as well as one of their working languages in the interpreting profession. All participants also reported English as one of their working languages. With the exception of one professional interpreter, all the participants also worked with other foreign languages.

Eight of the participants had studied foreign languages. Of these, four had completed a master's degree in Translation and Interpreting, one had completed a master's degree in Interpreting, and two were graduates of Philology/Linguistics master's programs. One had a master's degree in Teaching. One has a technical background, having graduated in Mechanical Engineering.

All participants reported continuous interpreting experience[6] (interrupted only during maternity or parental leave) ranging from 6 years to 25 years. The average length of experience in years was 14.22. For better comparability, we were also interested in the average monthly amount of interpreting activity expressed as a number of working days (one day = 8 hours). One subject, who was an employee of the European Commission, was a full-time interpreter. One subject could not quantify their average monthly interpreting workload, but stated that it was certainly less than full-time work. One interpreter

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4 In Slovakia, the university education of future interpreters is carried out as part of a joint study program focusing on translation and interpreting, and therefore not all such students tend to become interpreters.

5 Eight interpreters were paid remuneration for their participation in the research; one interpreter participated in the research without remuneration due to restrictions in his employment contract.

6 One interpreter was an employee of the European Commission, i. e. he interpreted exclusively for institutional needs and practiced interpreting only, not translation. Four of the interpreters combined freelance work with accredited work for the European institutions, one interpreter had previously been accredited for interpreting for the European institutions, and at the time of the study worked only on the freelance market, and three interpreters worked exclusively on the freelance market. Seven interpreters worked as translators in addition to interpreting. One interpreter had also worked as a translator in the past but was not translating at the time of the study. Three interpreters had been professionally involved in other activities in addition to interpreting, e. g. foreign language teaching, PR management, and speaker coaching.

was on parental leave at the time, so in her own words she interpreted only occasionally, very irregularly. The remaining subjects reported an interpreting-related workload of between 2 and 12 working days per month on average.

For the purpose of data processing in the quantitative part, we further divided this sample into professional interpreters with shorter experience (junior) and professional interpreters with longer experience (senior). The junior interpreters (N=5) in our research had between 6 and 10 years of experience. They were 3 females and 2 males aged 29 to 35 (mean age 31.4 years). The senior interpreters (N=4) had interpreting experience ranging from 20 to 25 years. These were 3 women and 1 man aged 43 to 54 years (mean age 49.5 years).

The results of these two groups of professional interpreters on a test designed to examine selective attention and executive functions (the Stroop test) were then compared with the results of interpreting students. As with the interpreter groups, convenience sampling of students was carried out. We decided to include students in the final year of their master's degree in Translation and Interpreting in the research sample, as they have the most experience with interpreting in university training and are likely to have a relatively accurate idea of what they would like to do professionally after graduation, compared to students in the lower years of study. Thus, five such students, who, according to their own statements, tended to be interested in interpreting and desired to pursue it professionally in the future, voluntarily participated in the research. The characteristics of the participants were obtained from individual semi-structured interviews conducted by two students as part of their master's theses. The student group consisted of 3 females and 2 males aged between 22 and 24 years (mean age 23.2 years). One student had about 80 hours of interpreting experience in addition to university training. All but one had experience with interpreting at an international conference as part of an internship. A brief overview of all the research groups is presented in Table 1.

Groups	Experience (years)	Mean age	Gender
students (N=5)	–	23.2	3 F/2 M
junior interpreters (N=5)	6–10	31.4	3 F/2 M
senior interpreters (N=4)	20–25	49.5	3 F/1 M

Table 1: Research groups

3.2 Research limitations

Despite our attempt to take a rigorous approach, our research design undoubtedly had its limitations. One of them is convenience sampling, i. e. reaching participants through direct contact, in the case of professional interpreters through a particular professional association, and in the case of students through the university. As mentioned above, given the specificity of the research sample, it was not realistic for us to opt for random

sampling; at the same time, we expected convenience sampling to yield subjects with a greater willingness to participate in the research, which was very complex, time-consuming, and often revealed quite private aspects of their personalities and lives. Thus, convenience sampling may have influenced the composition and representativeness of our research sample.

Another limitation of the research was the size of the research sample, which is related to the nature of the research itself, its complexity and time demands on both the research subjects and the researchers. The research did not only focus on the issue of interference, but also investigated many other aspects of interpreters' personalities and their interpreting performance; accordingly, the participants completed quite a large number of test tasks (tests on personality, motivation, cognitive flexibility, anxiety, and simultaneous interpreting performance). This may be the reason why only a small group of professional interpreters (N=9) and students (N=5) were willing to participate in the research.

Due in part to these limitations, we do not have the ambition to generalize our findings to all professional interpreters and interpreting students. However, as we will be correlating the data obtained in later stages of the research with findings from other tests, we are confident that we can at least suggest some potential trends worthy of further investigation.

4 Results and discussion

Basic descriptive statistics from the Stroop test yielded the following findings within each group (senior interpreters, junior interpreters, and interpreting students): the highest average interference raw score in our research was achieved by the junior interpreters (IF=15.69), followed by the students (IF=12.54), and the lowest interference raw score on average was achieved by the senior interpreter group (IF=4.82). At the same time, the junior interpreters also scored the best in other parts of the test (C, CW). Similarly, the senior interpreters achieved the lowest mean scores in all other parts of the test (Table 2).

Mean raw score	Word	Color	Color-Word	Interference
Students (N=5)	108.0	92.8	62.2	12.54
Junior interpreters (N=5)	107.8	93.4	65.6	15.69
Senior interpreters (N=4)	106.25	82.75	51.25	4.82

Table 2: Frequency analysis of the raw scores of the research groups in the subtests of the Stroop test

In order to make a more objective assessment, we compared the results of all the groups with a reference population representing the average Czech population (Krivá 2010). In the validation process, the mean values of the reference population were calculated for

education, gender, and age (Table 3). The analysis of the reference population (Krivá 2010) shows that higher mean scores are achieved by people with university education (compared to people with secondary education), women compared to men, and people of younger and middle working age compared to people of older working age. Since the highest scores in the standardization population are those of individuals in younger working age (regardless of educational level), the results suggest a significant effect of age on inhibitory processes. In Table 3, the values for the general population groups whose parameters correspond to the groups in our research are presented.

Mean score	Word	Color	Color-Word	Interference
University education (N=47)	94.05	75.86	47.10	5.30
Men (N=191)	87.87	68.52	39.56	1.26
Women (N=216)	89.50	73.17	42.22	2.10
Age 20-29 (N=70)	92.34	75.21	47.35	6.05
Age 30-39 (N=70)	92.95	77.11	48.08	6.12
Age 40-49 (N=70)	91.57	73.59	43.01	2.46
Age 50-59 (N=69)	85.65	68.36	38.62	0.81

Table 3: Validation of the Stroop test on the average Czech population (based on Krivá 2010)

A comparison of the average performance of the research groups with the raw scores of the reference population shows that all three groups (senior interpreters, junior interpreters, and students) scored higher on average than the general population on all subtests of the Stroop test (Figures 1, 2, and 3), even after controlling for all factors (education, gender, and age). With respect to age (regardless of educational level), people aged 30–39 score best on average across all subtests of the Stroop test, which is consistent with the best performance of the junior interpreters in our research group (mean age 31.4 years).

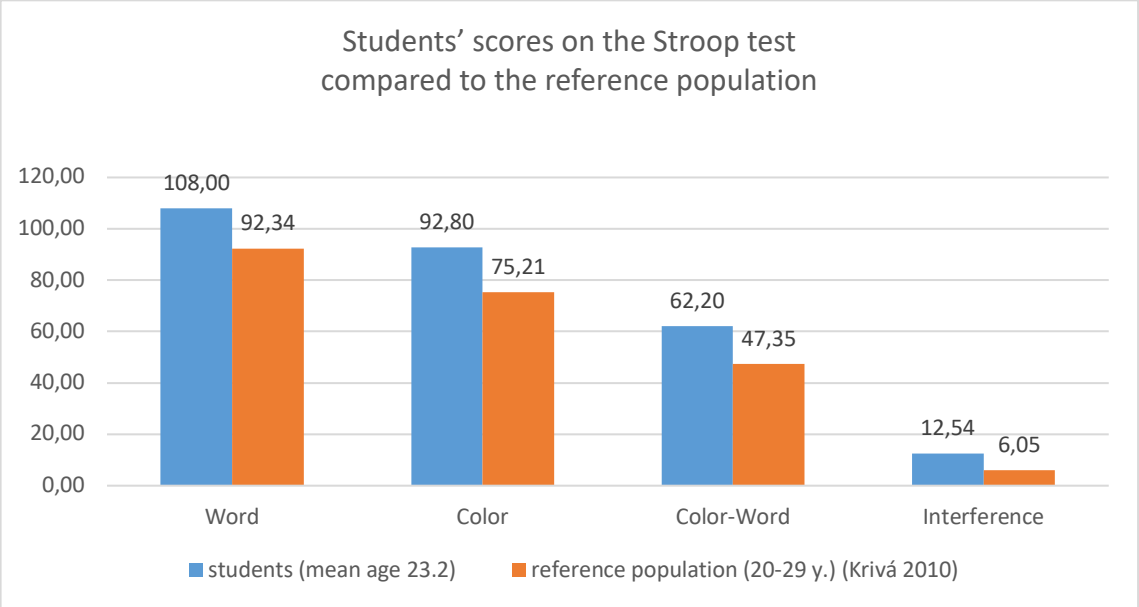

Fig. 1: Students' scores on the Stroop test compared to the reference population (based on age)

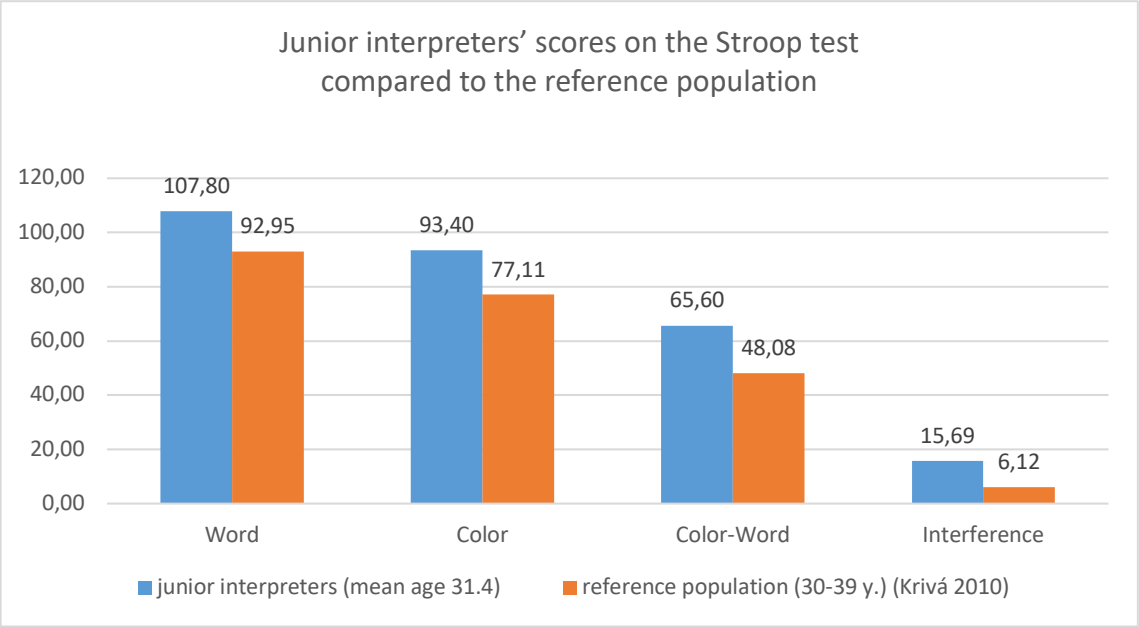

Fig. 2: Junior interpreters' scores on the Stroop test compared to the reference population (based on age)

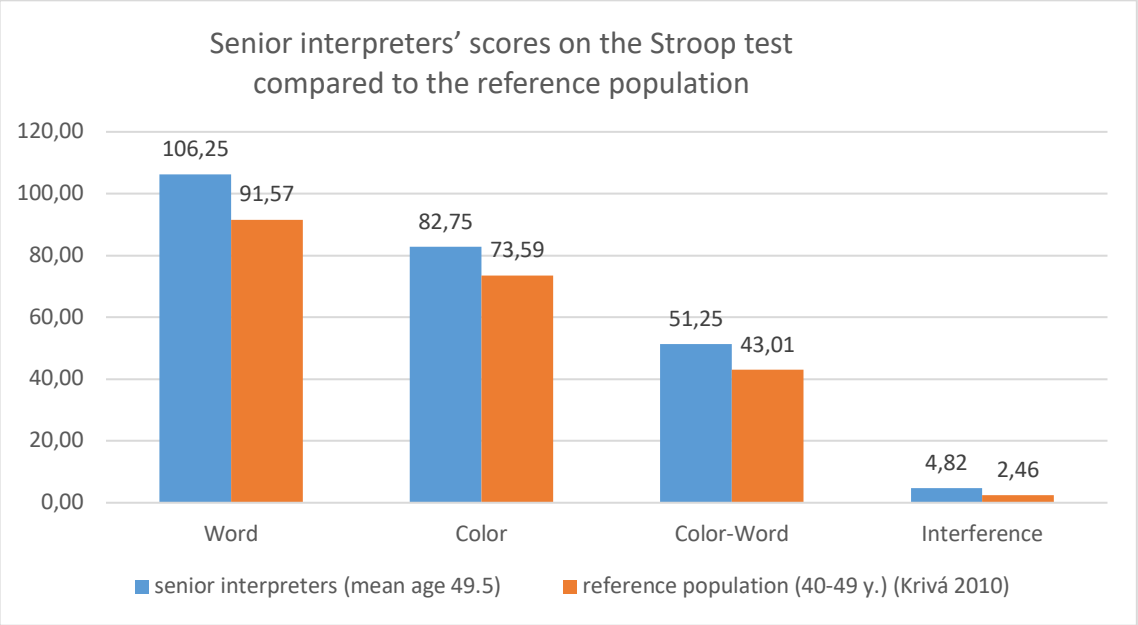

Fig. 3: Senior interpreters' scores on the Stroop test compared to the reference population (based on age)[7]

However, the relationship between interpreting and good performance on the Stroop test may, in our view, have various causal directions. In one direction, the better performance of interpreters and interpreting-inclined students on the Stroop test compared to the general population could mean that interpreter training and exposure to cognitive and translational tasks requiring the overcoming of interference improve the individual's general ability to handle interference. In the other direction, however, it could mean that people who naturally have a better ability to deal with interference will tend to be better at interpreting, as this ability directly contributes to a better interpreting performance. The question is thus whether predisposition or interpreter training play the key role.

Previous findings in this regard point to a relative resistance of the ability to cope with interference in the process of training future interpreters (Macnamara/Conway 2016), which could be interpreted more in favor of the importance of certain cognitive predispositions, but surely this issue would be worthy of further investigation with a longitudinal research design that explores students' initial predispositions and their development over the course of their training.

As can also be seen on the mean values in Table 3 (based on Krivá 2010), performance on the Stroop test also deteriorates with increasing age, especially significantly in the interference score; i. e. cognitive aging seems to play an important role in this partial skill as well. Analogically, in our research sample, it was the most

[7] As the average age for the whole group was under 50 (although rounding up the value would have resulted in 50), we decided to use people aged 40–49 as a reference group. If we had chosen a reference group aged 50–59, the difference in favor of senior interpreters would have been even higher.

experienced interpreters, aged 43 to 54, who achieved the lowest scores (but still higher than the general population). Similarly, the findings of other research (Hasher/Zacks 1979; Jennings/Jacoby 1993) confirm that it is the executive processes of memory and attention regulation that are more prone to cognitive aging compared to automatic and storage memory functions.

Due to the small sample sizes in each research group, the findings cannot be generalized. However, it can be concluded that in our research sample, all groups, including students, performed better compared to the general population. This raises the possibility that coping with interference is not necessarily associated with expertise and long-term practice in the case of participants in our research. This notion is supported by the fact that the senior interpreters achieved the lowest mean interference scores among the groups studied.

5 Conclusion

As a whole, the ability to deal with interference was measured as relatively high in all the research groups, i. e. both among students inclined to interpreting and professional interpreters with shorter and longer experience. All the groups scored higher on average than the general population, across all subtests of the Stroop test of interference. However, in the inter-group comparison, we found that the highest scores in our research sample were achieved by junior interpreters and, conversely, the lowest scores were achieved by the senior interpreters. Due to the small number of research subjects, the findings cannot be generalized, i. e. we cannot without doubt assume that the effects found in this study would necessarily be repeated when sampling a new, similar sized group of individuals. However, the best performance of professional interpreters with shorter experience is in line with the findings of Köpke and Nespoulous (2006). The senior interpreters scored relatively high on the Stroop test, but the lowest of the groups studied. This is indicative of their good ability to handle interference in cognitive tasks, but the result may also indicate a cognitive aging effect due to the age composition of this group, which is also present in the reference population in the Stroop test (Krivá 2010) and is present in general especially in executive processes of working memory (Hasher/Zacks 1979; Jennings/Jacoby 1993).

The students also scored well on the Stroop test, on average scoring higher than the general population, on all subtests. This result raises the question of whether effective coping with interference in their case is also a result of their interpreting training, or whether it is a natural predisposition that motivated them to pursue interpreting professsionally in the future. As the results of previous research (Macnamara/Conway 2016; Melicherčíková 2017) suggest a greater stability and resistance to interference in the training process, we might be inclined towards the latter supposition, but undoubtedly further longitudinal research on this issue is needed with a larger sample. As mentioned above, although the present study demonstrates partial results regarding interpreters' ability to cope with interference, our research overall focused on a more comprehensive

cognitive and personality profile of prospective and professional interpreters. Therefore, in the next stages, we will also attempt to assess the ability to deal with interference in relationship to other cognitive (e. g. mental flexibility) and personality characteristics (e. g. motivation), as well as interpreting quality.

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Authors

Miroslava Melicherčíková is a lecturer at the Department of English and American Studies at Matej Bel University, Slovakia. She teaches courses focused on improving students' interpreting and translation skills. Her research and publishing activities focus on selected aspects of consecutive and simultaneous interpreting, interpreters' personality and cognitive characteristics, as well as the didactics of interpreting. She has actively participated in several national research projects dealing with translation and interpreting.
E–mail: miroslava.melichercikova@umb.sk

Soňa Hodáková works as a translator and conference interpreter for national and international companies and institutions. She teaches seminars on translation, interpreting, and mental health at the Department of Translation Studies at Constantine the Philosopher University in Slovakia. Her scholarly activities focus mainly on research related to cognitive aspects of interpreting and research on the application of specific competences in the education of future translators and interpreters. She is a member of the international EMT working group on public service interpreting and translation (PSIT). She has also been the principal investigator of several research projects.
E–mail: shodakova@ukf.sk

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