
Bilingualism, Theory of Mind and Perspective-Taking: The Effect of Early Bilingual Exposure

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Abstract: The present study investigates the link between bilingualism, Theory of Mind and empathy among 240 mono- and bilinguals. We hypothesize that bilinguals have better theory of mind capabilities and empathic skills. Possible explanations for this evidence of a bilingual advantage are the early exposure to a second language and/or greater inhibitory control. 240 individuals, divided into two groups, participated in this study: Hungarian-Serbian bilinguals and Hungarian monolinguals. They filled out two questionnaires, one for the language profiles and Davis's Interpersonal Reactivity Index; and they participated in the Adult Theory of Mind test. Our hypotheses have been proven to be true. Bilinguals really have better empathic skills and the stories in the Theory of Mind test showed the difference in favor of the bilinguals, so we can assume a correlation between bilingualism, theory of mind and empathy, it is a trend and it is important for further upcoming bilingual researches.

Keywords: Bilingualism, Theory of Mind, Perspective-Taking, Empathy, Early Bilingual Exposure

1. Introduction

There are many different interpretations of the definition of bilingualism. The fundamental question is that to what extent two languages have to be present to consider someone bilingual [1], but there has not been a comprehensive definition that embraces every aspect. So what do we consider bilingualism? Several researchers have tried to answer this question. Grosjean's theory (1998) is that bilingualism is in fact a regular use of two languages [2]. According to Skutnabb-Kangas (1984), we can call someone bilingual, if s/he can communicate in two languages on a native language level [3]. Haugen (1953) says that bilingualism starts on the point when a speaker owns the ability to create meaningful statements in two languages [4]. The diversity of definitions is affected by our scientific viewpoint from which we approach this phenomenon. It can be seen that there are some differences between the theories; however, there is one agreement, bilinguals use two language codes in their daily life.

2. Cognitive Consequences of Bilingualism

Long has lived an assumption that early bilingualism affects the development of the mind in a negative way, because two languages present will disturb each other [5]. Peal and Lambert (1962) questioned this assumption and it was reported in their research that the expectation of difference in performance between monolinguals and bilinguals failed to provide the expected results [6]. Although it was thought that bilinguals would perform worse in language tasks and would achieve the same scores in the non-verbal spatial tasks, bilingual children were significantly more successful in most tasks, especially at symbol manipulation and reorganization [7]. They concluded that bilinguals have greater mental flexibility, concept formation and bilingualism gave them a set of diverse mental abilities. Subsequent studies have shown that bilingual children show significant difference in language tasks, in which focus is on the differences between form and meaning [8], and in non-verbal problems where they need to ignore the incongruent information [9]. Meta-analyses show that bilingual children

and adults have great benefits in terms of the executive functions [10], namely in stimulus selection and inhibition, when we choose the important stimulus from the stimuli around us and simultaneously inhibit the other [11]; selective attention, with the help of which we choose the relevant stimulus [12]; task switching, which is the ability of detaching from the irrelevant task-set and switching over to a more relevant set [13]; cognitive flexibility, which means the ability of rapidly adapting to unusual or unexpected situations and ignoring incongruent information and decision making, when we decide which one is the best to choose from the possible behaviors in the given situation [14]. These processes are crucial in controlling other cognitive functions.

Therefore early bilinguals have an advantage in cognitive inhibition, selection, attention control and maintenance, working memory operations, representations, thus they can quickly notice changes in their environment, and they can quickly adapt to these changes as well.

Bilinguals have also been reported to develop dementia 4 years later than monolinguals [15] [16] and to have a better cognitive outcome after stroke [17]. This is because bilingualism 'trains' the mind [18].

3. Relationship Between Bilingualism, ToM and Perspective-Taking

Conversations with others are opportunities for children to have their first experiences with interactions, which would give them evidence for others' intentions, mental states and beliefs, that is, for ToM.

Scientists have attempted to find the abilities which influence ToM. One of the most important among these abilities is language. Astington and Jenkins (1996) conducted experiments connected to this premise, and it was found that general language skills are positively correlated with mindreading [19].

Early bilingual environment may be important. Bilingual children's experiences of miscommunication with people who speak only one of their languages may lead to an earlier understanding that others have mental states (they use a different language), that differ from their own [7], so the language code should be changed for a successful communication. The realization that they must pay attention to the linguistic knowledge of others is very important in the developing of sociolinguistic competence.

Some studies say that bilinguals have more language controls operating simultaneously [20]. There is an adaptive control hypothesis, which states that the cognitive demand for verbal control increases among bilinguals, therefore a more advanced cognitive control develops, which affects every other non-verbal area [21]. Hartanto and Yang (2015) claims that according to this hypothesis, a better verbal control arises among bilinguals due to the bilingual context, which helps to create adaptive cognitive control [22]. Inhibitory control is a key component of this cognitive control, and bilingual children have an advantage on it and false belief ToM tasks, because

they have to inhibit their own knowledge to answer correctly about another's perception. This advantage in inhibition was demonstrated among children [23] [24], young adults [25] [26] and elderly people [27] [28].

Studies suggest that children who speak two languages can understand other people better. In a study an adult asked bilingual and monolingual children to move objects (toy cars) out from the adult's point of view. The children saw the cars (a small, a medium and a big one), including the small car that the adult couldn't see [29]. When the adult asked the child to move the small car, bilinguals moved the medium car in 75%, which is the smallest car that the adult could see, and monolingual children only did this in 50%. According to this data bilingual children were able to understand a different perspective better. 'To understand a speaker's intention, one must take the speaker's perspective. Bilingual exposure may promote effective communication by enhancing perspective-taking.' - say Fan, et al., and this perspective-taking is the basis of ToM and empathy.

Goetz (2003) used appearance-reality, perspective-taking and false belief tasks in 3-4 year old English monolingual, Mandarin monolingual, and Mandarin-English bilingual group. She found that the two monolingual groups performed similarly, but bilinguals outperformed monolinguals. Goetz thought, that bilinguals have these advantages because of superior inhibitory control and metalinguistic abilities, and they have a greater social sensitivity, which comes from interactions with monolinguals who don't understand one of their languages [30].

Metalinguistic awareness can be also important when we talk about better ToM skills in bilinguals. This advantage shows up when there are different ways of representing, that is, the same thing can be represented in different ways by two persons. Bilinguals understand earlier that every concept has two verbal labels on the two different languages and pragmatic experiences with these labels can help the understanding the fact that the same reality can be bound to different mental representations [20].

According to these theories, we think that a person, who started to use a second language in the critical period of second language acquisition (SLA), will have these advantages in childhood and adulthood too.

Singleton (1995) states that the early start of learning a second language is more beneficial, but highlights that there are exceptions, because 5% of bilinguals, who started to learn a second language after the critical period of SLA ended, can use a second language on a high level [31]. Lenneberg's (1967) theory of critical period of SLA says that a child needs to learn a second language before puberty (between age 2-10), because the brain loses plasticity after this age [32], and Penfield and Roberts (1959) are convinced about early exposure to two languages allows to switch between languages without confusion [33].

4. Hypotheses

In the present study we wanted to examine the positive

effects of bilingualism on theory of mind and perspective-taking (cold empathy). We hypothesize that (1) bilinguals' ToM ability is much higher than monolinguals', and that (2) bilinguals' perspective-taking (cold empathy) will be increased, so bilinguals would produce more correct answers on the adult ToM test and bilinguals would have higher scores on the empathy scale.

5. Method

5.1. Participants

240 people took part in the study, 120 men and 120 women, age ranged from 18 to 26 (mean = 20.31, SD = 1.47). They were classified into two groups, Hungarian-Serbian bilinguals from Vojvodina in one group and Hungarian monolinguals in the other group.

5.2. Questionnaires, Tests

The tests were used on Hungarian, because this was the common language of the participants. The questions of the 'language knowledge questionnaire' were adapted from the Language Experience and Proficiency Questionnaire (LEAP-Q) [34]. We asked questions on Hungarian (based on the English questionnaire), which revealed how many languages the individual spoke, which was the native language, when he had started to learn these languages and the use of those in a daily basis given as a percentage.

The ToM ability was measured with the Adult Mindreading Ability Test produced by Kinderman and his colleagues [35]. This test consists of 14 itemed materials, which includes stories and answer sheets. The items (stories) were translated to Hungarian by Bereczkei and Paal in 2010 [36]. In this study, according to a preliminary pilot research, five stories were used. The short stories contained various situations, life events, and there was some deception present in them (with or without intention), so we needed different levels of ToM ability for understanding them (for example: 'A thinks that B knows'; A thinks that B believes that C knows if D is lying'). The answer sheets included 1-1 statements, one of which corresponded to the story and it must have been selected by the participants which one is the correct one according to their understanding of the story. This test also contains statements without intentions, with which we can measure working memory and attention, so we can see, if a participant does not pay attention to the task, and we cannot use the data from these participants.

The measurement of empathic skills took place with the help of four factors from Davis's Interpersonal Reactivity Index. This questionnaire consists of 28 single proposition (7 per factor), which has to be answered in a five-point Likert scale (0-not typical for me, 4-completely typical for me). The four factors are: perspective taking, which means placing yourself in another individuals' situation; fantasy scale, which measures the tendency to being involved in the fictional stories; empathic concern, which measures the empathic reaction towards the other person; and personal

distress, which is an affective response and it measures anxiety related to the self. The first two factors measure cold (cognitive) empathy, the second two measure hot (affective) empathy [37].

5.3. Procedure

Participants completed the tests individually. The ToM stories were read out individually and in a random order, then the participants were given an answer sheet where they had to mark the statements that they considered corresponding to the actual story. After this test they filled out the two questionnaires. The time for completing the tests was not restricted.

6. Results

IBM SPSS Statistics 22.0 was used for the data analysis. We got lot of information on the participant's language knowledge from the language knowledge questionnaire. The native language was Hungarian in either group. Mono- and bilingual persons were participated in the study, and according to the theory of the critical period of SLA, the main difference between the groups was the beginning of second language (L2) use/exposure. Frequency analysis shows that the bilingual group started to use L2 (Serbian) between the age 1-6 (early bilinguals according to Lenneberg's theory) (see Table 1.), and the monolinguals after the 6th year (late bilinguals, because they started to use L2 after the critical period of SLA) (see Table 2.).

Table 1. Start of L2 use in bilinguals között.

	Frequency	%
Age 2	4	6.66
Age 3	23	19.16
Age 4	46	38.33
Age 5	1	0.83
Age 6	42	35

Table 2. Start of L2 use in monolinguals között.

	Frequency	%
Age 7	14	17.7
Age 8	20	16.6
Age 9	7	5.83
Age 10	16	13.33
Age 11	7	5.83
Age 12	4	3.33
Age 13	5	4.16
Age 14	11	9.16
Age 15	36	30

The other important difference between the groups was on the percentage of daily use of L2, as the bilinguals use two language codes more often (see Table 3.), than the monolingual group (see Table 4.).

Table 3. Percent of L2 use in bilinguals.

% of daily use	Frequency	% of the group
25	31	25.83
30	24	20

% of daily use	Frequency	% of the group
40	28	23.33
45	24	20
48	2	1.66
50	11	9.16

Table 4. Percent of L2 use in monolinguals.

% of daily use	Frequency	% of the group
0	68	56.66
1	4	3.33
2	1	0.8
4	1	0.8
5	10	8.3
10	29	24.2
15	2	1.7
20	5	4.2

First of all, with Descriptive Statistics scores revealed a mean of 5.42 ToM errors for the 22 questions (SD = 2.39), and the mean number of memory errors was 2.12 for the 18 questions (SD = 1.06). There is a higher proportion of ToM errors than memory errors, so we can say that the failure to answer a ToM question correctly was not correlated to the participant’s lack of attention or impaired memory.

Most of the hypotheses have been corroborated. MANOVA (independent variable: L2 start + L2 daily percent; dependent variables: ToM stories and empathy factors) test shows that bilinguals exhibit higher empathic skills along the cognitive and affective empathy. This analysis also shows that during the ToM test this difference appeared in the favor of bilinguals, this linguistic influence did not arise just in the second story (see Table 5). This story is easily understandable (it contains only tertiary intentionality; for example: A thinks that B believes that C is lying), so it cannot differentiate between the two groups, but the other stories establish the contrast between mono- and bilinguals.

Table 5. Differences in full sample.

	F-value	df	Significance (p)
Perspective taking	3.178	67	0.00
Fantasy scale	3.512	67	0.00
Empathic concern	2.341	67	0.00
Personal distress	3.516	67	0.00
1. ToM story	1.174	67	0.02
2. ToM story	0.977	67	0.53
3. ToM story	1.247	67	0.01
4. ToM story	1.478	67	0.02
5. ToM story	3.171	67	0.00
Whole ToM test	2.162	67	0.00

Pearson’s Correlation shows that among the factors affecting ToM and empathy, early bilingual exposure is important (see Table 6), because in this context, the individual quickly recognizes that the partner’s mental state is different from his own, as he uses other languages [20].

Table 6. The effects of early bilingualism Kőzött.

	Pearson r	Significance (p)
Perspective taking	0.478	0.00
Fantasy scale	0.488	0.00

	Pearson r	Significance (p)
Empathic concern	0.298	0.00
Personal distress	0.515	0.00
1. ToM story	-0.152	0.01
2. ToM story	-0.058	0.369
3. ToM story	-0.105	0.106
4. ToM story	-0.227	0.00
5. ToM story	-0.508	0.00
Whole ToM test	-0.462	0.00

With Pearson’s Correlation we found that late language learning can also cause the opposite effect and late bilingualism can have negative consequences on ToM and empathy as well (see Table 7). Late bilingualism probably have a negative effect on cognitive functions, as there are not two equivalent language skills being developed simultaneously, but a native language and a language from which we constantly need to translate, and the language processing procedures are not automatic, constant code-switching is required which is time-consuming and slows the other functions as well [38] [39].

Table 7. The effects of late bilingualism Kőzött.

	Pearson r	Significance (p)
Perspective taking	-0.506	0.00
Fantasy scale	-0.530	0.00
Empathic concern	-0.420	0.00
Personal distress	-0.442	0.00
1. ToM story	0.175	0.007
2. ToM story	-0.013	0.844
3. ToM story	-0.026	0.688
4. ToM story	0.150	0.02
5. ToM story	0.480	0.00
Whole ToM test	0.370	0.00

The Person’s Correlation results showed that the percentage of average daily use of the other language is greatly defining. Greater use of the second language creates error reduction in the ToM test and higher categories in terms of the empathy factors (see Table 8). So it is not enough to know or learn several languages, they also should be used to make the positive cognitive and social impacts noticeable.

Table 8. The effects of second language use in daily life.

	Pearson r	Significance (p)
Perspective taking	0.480	0.00
Fantasy scale	0.466	0.00
Empathic concern	0.600	0.00
Personal distress	0.558	0.00
1. ToM story	-0.163	0.01
2. ToM story	-0.080	0.215
3. ToM story	0.018	0.787
4. ToM story	-0.227	0.00
5. ToM story	-0.545	0.00
Whole ToM test	-0.455	0.00

7. Discussion

A large number of children grow up in an environment where people use more than one language. There are significant studies showing that this life experience has important consequence for children’s development. If a

bilingual child has these experiences and develops differently than monolinguals, the consequences will show up in adulthood too. This study examined the effects of bilingualism on ToM and empathy in older early bilinguals and monolinguals, matched on when they started to learn a second language. Performance of active bilinguals and monolinguals was compared on the Adult Theory of Mind Test and the Interpersonal Reactivity Index. In general, the study reveals a bilingual advantage, bilinguals perform significantly better than monolinguals on the ToM tasks, and it seems, they have better empathic skills too.

Bilingual environment may be greatly defining, where bilingual children sociolinguistic awareness increases, because they always need to match the language to the interlocutors language for successful communication, so they understand easier that others' mental state can be different from their own, and this can make others' mental state also more salient [7].

Greater linguistic cognitive control over conflicting language codes between the bilingual and the interlocutor may produce a greater inhibitory control. Inhibitory functions of bilinguals are sharpened to be selective in different situations. One must choose what is appropriate in the given situation and enables him to achieve the best outcome, while at the same time, the other language need to be inhibited [27]. Bialystok (1999) also says that bilinguals need a higher level of control over their selective attention so that they differentiate between conflicting representations [40].

Then again bilinguals are able to notice earlier that one object can be represented in two ways linguistically (on the known different languages). These different verbal labels and experiences with these labels can help bilinguals to understand different representations easier [20]. This is the basis of metalinguistic awareness and might help on the ToM tasks and perspective-taking.

What about empathy? We can differentiate between cold (cognitive) and warm (affective) empathy. The cold empathy can help us recognize the state of the other person, which is the perspective-taking. The next level is the hot empathy which means that the observed emotional state induces a similar condition in the observer [41]. It is been considered that a high developed ToM ability is associated with cooperation and a high degree of empathy. The emergence of bilinguals' representations about the people's different mental states is often associated with the more sophisticated perspective-taking. So we think that the increased ToM ability has a mediating role to increased empathic skills in bilinguals.

8. Conclusion

According to this study we can say that bilingualism develops cognitive benefits and these cognitive benefits will be advantageous in the term of social intelligence. In sum, the cognitive correlates of early exposure to two languages include better inhibitory control, greater cognitive flexibility and enhanced ToM. Second language learning in the critical

period of SLA provides along many functions effective solutions and execution. It is clear that the consequences of speaking two or more languages are substantial, in some cases the advantages are dramatic, e.g. bilingualism delays the onset of Alzheimer's disease by 4 to 5 years, which means that bilingualism has a positive effect on cognitive reserve too [42]; there are even higher salaries for college-educated bilinguals compared to monolinguals [43], and as we can see, there are social benefits too associated with being bilingual.

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