ARTICULATION AND SPEAKING RATES IN BILINGUALS WITH REGARD TO TIME OF EXPOSURE TO ONE LANGUAGE

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SUMMARY

The basic aim of the research presented in this paper was to check whether the language proficiency level of bilingual children with Polish as one of their languages is also related to the pace of speech, which is the result of two specific parameters i.e. articulation rate and speaking rate. It was assumed that children who use Polish more rarely and mostly at home will display slower speaking and articulation rates when contrasted with children who use Polish both at home and at school on an everyday basis.

Participants were thirty-two children who speak Polish as one of two languages, the first research group consisting of sixteen Polish-French students at the age of 8.11 living in Wallonia. The second group consisted of sixteen Flemish-Polish students living in Flanders. Here the average age was 9.3 and subjects used Polish much less than their first group counterparts. The comparative analysis included the following parameters essential for the description of the rate of speech: 1. basic: average speaking rate (phones/sec., syllables/sec., duration of pauses), average articulation rate (phones/sec., syllables/sec.), average ratio of pauses in speech sample (number and percentage), 2. accessory: average duration of all pauses (sec.), average duration of proper pauses (sec.), average duration of filled pauses (sec.), average duration of semi-filled pauses (sec.). The numerical data from the research was obtained with the use of free Audacity software.

The results showed that there were no statistically significant differences between the two research groups in either the basic or the accessory speech rate parameters. In the Polish-French group the results were comparatively better but still statistically insignificant. It seems that the data obtained will confirm the need for considerable caution in the evaluation of the competence of bilingual children with high language skills. Similar to children with imbalanced bilingualism, these children may also, perhaps, require some extra time to deal with certain language tasks.

Key words: bilingualism, speaking rate, articulation rate, pauses

¹ On the basis of speech samples produced by Polish-French and Polish-Flemish speaking children living in Belgium
INTRODUCTION

Measurement of the rate of speech can constitute a sensitive indicator for the description of human linguistic functioning. The rate of speech is influenced by several factors – the individual predispositions of the speakers including their health (biolect), their emotional state, communicative situation, vocational and social background (sociolect), pronunciation style, speech disorders, and finally, their language system.

The rate of speech can be described from two perspectives: a narrow one, which analyses the articulatory movements within a given period of time, and a broad one, which adds a description of the pauses that accompany articulatory movements within the speech sample. For an evaluation employing the narrow approach, it is possible to use only regular rhythmical phrases of approximately 2-3 seconds in length which constitute a perceivable whole (Wagner, 2017; Woźniak, 2012). The broad approach cannot be limited to such short units, as this would make it impossible to discern the pauses which appear within the speech sample. The first of the perspectives is tied to the notion of articulation rate, which provides information on the number of phones, or sometimes syllables, within the speech sample and the unit of time. The second approach makes it necessary to formally characterize the pauses (duration and type) which appear alongside the rhythmical phrases and, together with phones and syllables, construct the sentence (Lowit, 2014; Wagner, 2017).

Pauses, which are unimportant during the measurement of articulation rate, denote the lack of sound within the system of the acoustic signs and are considered to be empty spaces within the voice wave (Polański, 1999). Types include proper pauses, filled pauses, and semi-filled pauses. Pauses are crucial for the measurement of the speaking rate which takes into consideration phones and syllables as well as the pauses themselves. Therefore, while measuring the speaking rate, it is necessary to study speech samples which are longer than single speech phrases (Michalik & Solak, 2017). A proper pause denotes the moment of silence between units of utterance, while a filled pause refers to one of three possible situations: the pause is filled with a lexical unit (usually with an element of the utterance itself or a phatic unit), the pause is filled with an articulated sound (en-lengthened vowel or a group of consonants), or the pause is filled with unarticulated extra-linguistic sound (e.g. coughing). Semi-filled pauses result from the combination of proper pauses with filled pauses (Śniatkowski, 2002).

In brief, articulation rate is informative only about the number of phones/syllables in a speech phrase within a unit of time. To evaluate the speaking rate, we need to include not only the number of phones/syllables but also the duration of the pauses which appear between or, more rarely, within the speech phrases (Lowit, 2014; Wagner, 2017).
COGNITIVE FUNCTIONING OF BILINGUALS WITH VARIED LEVELS OF LANGUAGE PROFICIENCY

Research carried out in recent years has not yet produced any clear conclusions in regard to the language processing or other aspects of cognitive functioning in bilinguals. Some research points out the benefits of bilingualism, e.g. inhibiting insignificant information (Bialystok, Craik, & Luk, 2008; Kempert & Hardy, 2015; Ransdell, Barbier, & Niit, 2006), shifting between different elements of the cognitive system (Garbin et al., 2010; Prior & MacWhinney, 2010), taking on the perspective of another person (Fan, Liberman, Keysar, & Kinzler, 2015), and improved metalinguistic awareness (Goetz, 2003). However, other authors have emphasized impaired functioning with regard to verbal tasks such as picture naming, semantic fluency, or word production (Gollan, Fennema-Notestine, Montoya, & Jernigan, 2007).

According to Michael and Gollan (2005), such a situation is the result of the fact that bilinguals’ lexicon is approximately twice as large as that of monolinguals. What is more, the reason for extended language processing (Gollan, Montoya, Fennema-Notestine, & Morris, 2005; Gollan, Montoya, & Werner, 2002, Ivanova & Costa, 2008; Starreveld, de Groot, Rossmark, & van Hell, 2014) can be found in the constant co-activation of the two languages (Kroll, Bobb, & Hoshino, 2014; Kroll, Bobb, & Wodniecka, 2006; Thierry & Wu, 2007), which happens involuntarily in both adults and children (von Holzen & Mani, 2012). The results for bilinguals can also be affected by what some researchers (Ivanova & Costa, 2008, Bialystok, Luk, Peets, & Yang, 2010) indicate as the weaker functioning of the phonological loop, which is responsible for the storage of phonological memory traces and the repetition of verbal material. Some researchers (Bialystok & Feng 2009; Gollan & Acenas 2004; Portocarrero, Burright, & Donovick, 2007) stress that the weaker results for bilinguals in verbal tasks may be a direct result of their difficulty in accessing and extracting words from the mental dictionary. Michael and Gollan (2005) highlight that the weaker word–notion relations for bilinguals in both languages can result from the necessity to manage more than one lexicon. According to Gutiérrez-Clellen (2002), children who are in the process of acquiring fluency in L2 may need more resources to process the meaning of words on the basis of phonological, semantic and syntactical clues.

The largest percentage of the latest research is focused on balanced bilingualism, with a few studies accepting language proficiency as an independent variable. For example, Bialystok, Craik, & Luk (2008) have proved that even though bilinguals generally perform less efficiently than monolinguals in verbal fluency, there are situations in which they can actually outperform them. In one study with modified criteria, in which participants were not allowed to use different forms of the same verb, high proficiency bilinguals scored higher than both low proficiency bilinguals and monolinguals in tasks which required them to use
words starting with specific phones (but not in tasks which involved words of a specific semantic category). The level of language proficiency seems to be a factor in such research cases. Gollan et al. (2007) stress that the level of bilingualism clearly influences performance in picture-naming tasks. Additionally, Segalowitz, & Frenkiel-Fishman’s (2005) research concluded that competence in the degree of shifting is closely related to second language competence. So, it is likely that a significant role is played by both the level of language skills among bilinguals and their enhanced metalinguistic awareness, in comparison to monolinguals.

It is worth noting that, according to many researchers (e.g. De Houwer 2011; Pearson 2007), frequency of use is the most important factor in the proficiency of any language.

Some researchers (Green, 1998; Hsu, 2017) suspect that the level of activation of two languages in bilinguals and their ability to inhibit one of these languages when necessary correlates to the level of linguistic competence. Those proficient in two languages are able to inhibit both with equal ease. Bilinguals with one dominant language, however, do not need to put as much effort into suppressing the weaker language because it activates on a lower level than L1. Conversely, they need stronger inhibiting mechanisms for the influence of the dominant language.

Although this process may require more critical attention, it can therefore, in some cases, be associated with slower speech rates. It should be borne in mind, however, that bilinguals are often more efficient than monolinguals when it comes to inhibiting (Bialystok et al., 2005; Costa, Hernandez, & Sebastian-Galles 2008), which in turn may eliminate the effects of increased demand for conscious attention. On the other hand, there is evidence in the literature that the degree of language proficiency may not necessarily be associated with the degree of verbal and non-verbal tasks in some executive functions (Rosselli, Ardila, Laxmi, Lalwani, & Vélez-Uribe, 2015).

Even though the majority of the research relates to bilingual children’s ability to access words from the mental lexicon, we assumed that the same conclusions might also pertain to narrative abilities, even more so when we consider the research of Hipfner-Boucher et al. (2014), who noticed weaker competence in vocabulary diversification and sentence length in children who rarely used English at home in comparison to those who used it relatively often.

Negative transfer and the more difficult access to their own lexicon (Bialystok, 2009; Gollan et al., 2005) may also result in different forms of disfluency in the speech of bilinguals. For example, Howell, Davis, and Williams (2009) have shown that bilingual children are at a greater risk of stuttering than monolinguals. They also demonstrated that the risk is greater in children who had been exposed to two different languages before starting their education. According to the authors, being monolingual before starting school can either decrease the risk of stuttering or improve the condition if it appears in the future. However, it must be added that some researchers (e.g., Packman, Onslow, Reilly, Attanasio, & Shenker, 2009) claim that such conclusions should be approached with caution.
and that all variables should always be controlled, especially when we take into consideration the hypothesis of linguistic interdependence (Cummins, 1979, 1981), which considers L1 competence to be closely tied to L2 competence on condition of proper language input and the motivation to improve both the first and second language.

Episodes of disfluency in bilingual people may be tied to the type of bilingualism. Bilinguals, as some research indicates (Lennon, 1990; Poulisse, 1999; Rieger, 2003), produce more language errors in L2 than in L1, as well as more errors in general when compared to monolinguals. According to Byrd, Bedore, and Ramos (2015) an increased number of language errors does not imply that bilinguals are unsure of their language usage. On the other hand, increased language competence may increase the uncertainty over which form should be used.

Research exists which clearly shows the presence of disfluencies in bilinguals which may slow down their speech rate. These disfluencies include lexical, grammatical and phonological revisions, filled pauses, and repetitions of sounds, parts of words, or entire words and phrases (Bedore, Fiestas, Peña, & Nagy, 2006, Byrd et al., 2015). These may interfere with the differential diagnosis of stuttering because it is not always clear if the disfluencies are the result of the co-activation of languages or actual stuttering problems (Yairi & Seery, 2011). According to Ambrose and Yairi (1999) language problems such as revisions, unfinished words, repetition of phrases or multi-syllable words, are not the results of stuttering and are a variable connected to bilingualism, or at least to some types thereof.

In our previous research (Michalik, Czaplewska, Solak, Szkotak 2018, 2019) the following results were obtained within the framework of Polish-French bilingualism: statistically significant differences were noted between monolingual and bilingual students in terms of average speaking rate, average articulation rate, ratio of pauses within the speech samples (%), average duration of all pauses, average duration of proper pauses, and average duration of semi-filled pauses. There were, however, no differences in the number of pauses, nor in the duration of filled pauses. In short, monolingual children displayed faster articulation and speaking rates. In the case of Flemish-Polish bilingualism, statistically significant differences occurred within average speaking rate, average articulation rate, duration of speaking, ratio of pauses within the speech samples (%), average duration of all pauses, average duration of proper pauses, and average duration of the filled pauses. At the same time, there were no differences within the number of pauses nor average duration of semi-filled pauses. The longer pause times in bilingual children can be attributed to prolonged speech processing. In the longer unfilled and partially filled pauses there are moments of silence during which (if they lack a semantic function), it is likely that more intensive information processing occurs. They can be used for example to search for the right expressive or grammatical forms.

The basic aim of the research presented in this paper is to check whether the language proficiency level of bilingual children with Polish as one of their languages is also related to the pace of speech, which is the result of two specific
parameters i.e. articulation rate and speaking rate. Taking into consideration the research presented above, it was assumed that children who use Polish more rarely and mostly at home will display slower speaking and articulation rates when contrasted with children who use Polish both at home and at school on an everyday basis.

PROCEDURE

The first stage of the research included the recording of children’s speech from both research groups. Each of the students knew the person who was responsible for the recording (student-teacher relationship). Several emotionally neutral questions were asked during these individual meetings: What do you do in the classroom/group? What do you play with the group? What did you do in the clubroom? What have you done today? What did you do yesterday? What do you usually do at home? What are you going to do?

A specific fragment of recorded sample was selected, which had to be continuous and uninterrupted by the listener. Each fragment was to be thirty seconds long. If the sample included several thirty-second fragments, the first of these was always selected. Analysis of the sample started with multiple listening and the preparation of a simplified transcription, allowing for the marking of phones and syllables and their number. Additional information was also marked on the transcription such as pauses made by the speaker, their duration and form.

The basic parameters of the study were average speaking rate (phones/s, syllables/s + the duration of the pauses), average articulation rate (phones/s, syllables/s), and ratio of pauses within speech samples (number + percentage data). Additional parameters included average duration of all pauses (s), average duration of proper pauses (s), average duration of filled pauses (s), and average duration of semi-filled pauses (s). Audacity software was used during this stage of the research. Due to the presence of filled and semi-filled pauses which in some cases take the form of repetitions, it was impossible to use software which automatically indicates and measures pauses within a sentence, as this software cannot distinguish pauses containing phonic elements.

After calculating the number of phones and syllables in the speech sample, it was possible to measure the articulation rate. Further analysis involved data connected with the quantitative and qualitative characterization of the pauses within the speech sample. This stage allowed for the measurement of the speaking rate and the percentage ratio of the pauses.

PARTICIPANTS

The first research group consisted of sixteen bilingual students with no developmental or communicational disorders at the age of 8.11, with a 5:11 ratio

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of girls/boys. It was assumed that at this age linguistic competence has already been acquired. The participants are students at the Polish section of European School Brussels I who use Polish at school (from Monday to Friday) and French and Polish at home\(^3\). If we assume that simultaneous bilingualism occurs when L2 is introduced before the third year of life, the students meet this criterion as they were born in Belgium to Polish-French parents who used the OPOL strategy of *one person, one language*. These children use Polish more than 50% of the time, and in various situations – they use more formal language daily at school, whereas at home they engage in everyday colloquial conversations with one parent. Therefore, it should be assumed that their command of Polish remains at a relatively high level. The Polish specialist collecting interviews from children certainly did not raise any objections with regard to their level of Polish. As these children were born and raised in Belgium and have communicated with one of their parents in French since birth, it can be assumed that their bilingualism oscillates towards a balanced level.

The second group also consisted of bilingual students, likewise without developmental or communicational disorders. They were at an average age of 9.3, with the same girl/boy ratio as in the first group. The children are students of two different schools in Leuven, a city situated in the Flemish-speaking part of Belgium: Polska Szkoła im. Wisławy Szymborskiej (Wisława Szymborska Polish School) and Polska Szkoła ‘Mała Daskalia’ (‘Mała Daskalia’ Polish School). The children attend classes on Saturdays only and the lessons themselves are supplementary in nature. Their motivation to use the Polish language is comparatively low because Flemish is spoken at their regular schools and when talking to peers\(^4\). The students, who were born in the Flemish-speaking part of Belgium to parents of different nationalities, have been able to speak both Flemish and Polish since early childhood, so we can also assume their simultaneous bilingualism. Even though the OPOL strategy has been used, it may be justified to assume that they represent the unbalanced type of bilingualism, in which the Polish language is less prestigious and dominated by Flemish. In addition, these children attend Flemish schools every day, and only on Saturdays do they have the chance to come into limited contact with more complex Polish, mainly related to the teaching of the language and elements of Polish history. Therefore, the time of exposure to the Polish language in this group is significantly lower than 50%. According to the results of many studies, proficiency in a language is proportional to the exposure to that language and the quantity of exposure to each language is a reliable predictor of vocabulary acquisition in each (e.g. Thordardottir, 2011). Such results were also obtained in the case of children for

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\(^3\) The curriculum of the European School is the result of an agreement among the national ministries of education to foster the learning of the native language and traditions while living in multicultural and multinational society in order to create a bond with other Europeans and respect for one’s own cultural identity.

\(^4\) Flemish belongs to the western subgroup of Germanic languages and is used by the Flemings in Belgium as the official language. It is very dialectically varied. It is most closely tied to Dutch and together they constitute a continuation of the Germanic dialects of Lower Franconia (Polański, 1999).
whom Polish is one of two languages (Miękisz et al., 2017). Therefore, it was assumed that the Flemish-Polish children participating in the study would exhibit lower competence in the Polish language than the French-Polish children.

RESULTS

In order to verify the research hypothesis about the possible differences in the rate of speech criteria, a quantitative analysis was conducted to compare the following parameters: average speaking rate, average articulation rate, average duration of speaking, average number of pauses, ratio of pauses, average duration of pauses, average duration of proper pauses, average duration of filled pauses, and average duration of semi-filled pauses.

The significance of the numerical data obtained was verified statistically, statistical analyses being performed with the use of the Shapiro-Wilk test, Mann-Whitney test, and parametric T-test, for which the results are shown in Tables 1 and 2.

With a statistical significance of $p = 0.05$, the performed tests did not reveal any statistically significant differences in either basic or accessory speech rate parameters between the two research groups. The results for Polish-French simultaneous balanced additive were comparatively better but still statistically insignificant.

Table 1. Statistical data obtained from an analysis of the parameters for duration of speaking, articulation rate, speaking rate.
Source: original research

<table>
<thead>
<tr>
<th></th>
<th>Polish-French simultaneous balanced additive bilingualism</th>
<th>Flemish-Polish simultaneous unbalanced subtractive bilingualism</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$M$</td>
<td>$SD$</td>
</tr>
<tr>
<td>Duration of speaking</td>
<td>14.71</td>
<td>4.21</td>
</tr>
<tr>
<td>Average articulation rate: phones/sec.</td>
<td>9.28</td>
<td>1.48</td>
</tr>
<tr>
<td>Average articulation rate: syllables/sec.</td>
<td>3.84</td>
<td>0.50</td>
</tr>
<tr>
<td>Average speaking rate: phones/sec.</td>
<td>4.61</td>
<td>1.66</td>
</tr>
<tr>
<td>Average speaking rate: syllables/sec.</td>
<td>1.90</td>
<td>0.65</td>
</tr>
</tbody>
</table>

$M$ – average; $SD$ – standard deviation; $Me$ – median
The results obtained in the research did not confirm the assumption as to the slower speaking and articulation rates of bilinguals with less Polish language competence in comparison to bilingual children with higher competence. This assumption was based, among others, on studies (see: Bialystok & Feng 2009; Gollan & Acenas 2004; Portocarrero, Burright, & Donovick, 2007) which show that it might be relatively more difficult for bilinguals to access their mental lexicon during verbal tasks. According to Michael and Gollan (2005), the weaker word-notion relations in the two languages of bilinguals may derive from the necessity to manage more than one lexicon. We also relied on the results of studies which revealed that children with lower language proficiency may need more resources for processing narratives (Gutiérrez-Clellen, 2002). We assumed that the more often children use a given language, the easier it is for them to access their mental dictionary, and therefore, there should be less evidence of longer processing like pauses or disfluency in their utterances. As the Polish-Flemish speaking children used the Polish language less frequently and in fewer contexts, we presumed their proficiency in this language to be lower than the Polish-French speaking children, and consequently, Polish-Flemish speaking children might show a slower speaking pace than their Polish-French peers. However, the research groups did not differ in this category, even though Polish-French speaking children used Polish more often and in a wider variety of contexts than the Polish-Flemish speaking children.

### DISCUSSION

The results obtained in the research did not confirm the assumption as to the slower speaking and articulation rates of bilinguals with less Polish language competence in comparison to bilingual children with higher competence. This assumption was based, among others, on studies (see: Bialystok & Feng 2009; Gollan & Acenas 2004; Portocarrero, Burright, & Donovick, 2007) which show that it might be relatively more difficult for bilinguals to access their mental lexicon during verbal tasks. According to Michael and Gollan (2005), the weaker word-notion relations in the two languages of bilinguals may derive from the necessity to manage more than one lexicon. We also relied on the results of studies which revealed that children with lower language proficiency may need more resources for processing narratives (Gutiérrez-Clellen, 2002). We assumed that the more often children use a given language, the easier it is for them to access their mental dictionary, and therefore, there should be less evidence of longer processing like pauses or disfluency in their utterances. As the Polish-Flemish speaking children used the Polish language less frequently and in fewer contexts, we presumed their proficiency in this language to be lower than the Polish-French speaking children, and consequently, Polish-Flemish speaking children might show a slower speaking pace than their Polish-French peers. However, the research groups did not differ in this category, even though Polish-French speaking children used Polish more often and in a wider variety of contexts than the Polish-Flemish speaking children.
The lack of difference in the rate of speech in two different types of bilinguals may indicate that the effort and time needed for bilinguals to process linguistic information is not linked to language fluency. Bilingualism itself is a significant enough factor to exert a negative influence on the processing of linguistic material and its subtypes become irrelevant in terms of how they themselves can affect this process.

Perhaps, therefore, the longer duration of language processing for bilinguals demonstrated in numerous studies (e.g. Bialystok & Feng 2009; Gollan & Acenas 2004; Portocarrero, Burright, & Donovick, 2007) appears regardless of the type of bilingualism. As indicated by some research (Bialystok et al., 2010; Ivanova & Costa, 2008), the weaker functioning of the phonological loop may occur equally in bilinguals who use both languages to a similar degree and in those who use the second language less frequently. Therefore, it is likely that the level of language proficiency expressed in the quantity and quality of processed material is associated not so much with the longer time required for articulation and expression in bilingual children, but it is rather connected with the two languages being used on a regular daily basis. Perhaps also there is a certain level of competence in bilingualism beyond which language processing no longer demands more time.

In addition, we cannot ignore the fact that the Polish-Flemish-speaking children examined in the course of the study could have been subjected to intensive Polish language education at home and in the Saturday school and, consequently, the threshold beyond which differences in the rate of speech are irrelevant was exceeded.

Perhaps the most important factor in the level of fluency is language input in the early stages of language development. The more significant the input was, the better the child’s competence in vocabulary, reading and writing is (Duursma et al. 2007; Scheele, Leseman, & Mayo, 2010). On the other hand, due to the fact that the narrative of the speech samples included mainly everyday language (even though the children spoke about school, the questions resembled the usual ‘how was your school day?’ question of parents at home), the actual level of language fluency connected with these topics may not constitute a differentiating factor between the two research groups. Had the conversation perhaps revolved around other topics, different results may have been obtained. Certainly, this issue requires more extensive research, given the fact that we did not control the degree of similarity between Flemish and French and Polish as languages.

The results obtained can be explained at least in part by microgenetic theory. In this context it is important to emphasize again that genuine change occurs in the actualization of the brain/mind state (epoch), and that apparent or illusory change occurs in the transition of one brain/mind state (epoch) to another (Pachalska, MacQueen & Brown, 2012; Pachalska 2019). Genuine change is the becoming-into-being (existence) of an entity – the actualization of a sequence of categories - while apparent change is the progression from one brain/mind state (epoch) of being to another, namely, the observed and presumed causal sequence of events in the world. An epochal state is an instance of being that is
inert, its dynamic – becoming – exhausted in its formation (Brown 2015). The process of entity creation is complete on the actualization of an epoch of being (category, substance), which on achieving existence passes away in its replacement, while continuity depends on the overlap of epochs (Fig. 1).

The brain creates ideas based on insights. The duration of the image depends on a whole range of features, where emotions play the main role. Pleasant events are subjectively perceived as shorter (e.g., meeting with a friend), unpleasant events have a subjectively longer duration (e.g., waiting in the waiting room for a dental procedure). Thus, the event has a more or less arbitrary duration in a series of repetitive brain/mind (epoch) states. The exchange rate is probably constant for each unit. The dynamics of the brain/mind state are associated with changing objects and events, and with our attitude to them. The real change in the mind of the observer is imperceptible.

The formation of patterns of neuronal connections from the early stages of the development of a given language guarantees a smoother transition of the mental state to consciousness, which in turn is associated with the knowledge and fluency of this language. On the other hand, emotional situations affecting the language (vocabulary, reading and writing) affect the language learning process. Gazzaniga (2011) emphasizes that this is how our left hemispheric (language) interpreter of the world develops, what connections we have and how long they formed into specific patterns that underlie the language.

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**Fig. 1** Phases in working memory are generally revived in ensuing states in the order of their registration, i.e., in relation to their resemblance to the oncoming brain/mind state and, thus, their capacity for revival. Images closer to the current perception, i.e., those in short-term memory that almost achieve re-perception, are most likely to be revived in the current mental state. The brain/mind state at T-1 is replaced by an overlapping state at T-2. The core of T-1 is overlapped at T-2 before T-1 terminates, i.e., before the epoch exists. This explains the recurrence of early phases in T-1 associated with individuality, self, character, dispositions, long-term and experiential memory, and the “persistence” of core beliefs, values and personality. Later phases perish on completion of the entire state to make way for novel perceptions. The re-activation of earlier phases by the overlapping state explains the sustained personhood behind succession. Early phases are an ingredient across states, later ones are malleable to a greater extent as the endogenous process is shaped by sensation.

Source: Pachalska, MacQueen & Brown, 2012
To sum up, the results presented are merely an introduction to the topic of the speech and articulation rate of bilinguals and are far from conclusive in revealing if the duration of pauses is the same in both types of bilingualism whatever the topic of conversation and degree of language fluency. This subject will certainly require further research, especially when one considers the fact that the present study involved only sixteen participants. However, it seems that the data obtained will confirm the need for considerable caution in the evaluation of the school competence of bilinguals with high language skills. Similar to children with imbalanced bilingualism, these children may also, perhaps, require some extra time to deal with certain language tasks.

REFERENCES


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