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The operationalization of bilingual linguistic experience and its relationship with executive function

1. What is linguistic background?

Research on bilingualism has always been interested in the relationship between linguistic background (often interchangeably labelled as language experiences, linguistic experiences, language background) and bilingual processing (including production, perception, storage and control). Several studies have pointed out that bilingual's age, mode of language acquisition, language proficiency and dominance, as well as past and present experiences of language use could have an influence on cognitive organization and processing of the known languages (Chen, 1992; Grainger, 1993; Kim et al., 1997; Kroll-de Groot, 1997; Perani et al., 1998; Marian-Spivey, 2003). All elements of the linguistic experience compose a complex picture of individual bilingualism and could influence language processing. Consequently, definitions of and approaches to linguistic backgrounds are still being discussed (see De Cat, 2023 for a recent review).

The operationalization of bilingual and/or multilingual linguistic background has received substantial attention in the research investigating the relation of linguistic backgrounds and executive function (EF). The latter term refers to the general purpose control mechanism that modulates various cognitive processes and thus regulates the dynamics of human cognition (Green-Abutalebi, 2013; Luk-Bialystok, 2013; Bialystok, 2016; DeLuca et al., 2019; Surrain-Luk, 2019). The most frequently studied elements of EF are (Miyake-Friedman, 2012):

1. *Inhibition* – ability to deliberately suppress dominant, automatic, or prepotent responses when necessary;
2. *Updating* – constant monitoring and coding of incoming information for relevance;
3. *Shifting* (sometimes called *switching*) – the capacity to shift or switch one's thinking and attention between different tasks or operations.

The executive function was theorized to be related to linguistic experiences based on studies which confirmed that the bilingual's languages remain active in one's mind at all times (e.g., Kroll et al., 2006; Bialystok, 2009). Consequently, language use requires an effort to control the inhibition and activation of the languages, redirect the attention between the known languages, conversational topics and various processes involved in language use (Grainger-Dijkstra, 1992; Green, 1998). Exercising and developing language control abilities were suggested to influence the general, non-linguistic cognitive control abilities (the executive function) (Bialystok, 2001).

While there is a considerable body of research supporting the theory about the relation between linguistic experiences and the executive function, numerous studies have challenged the validity of this theory (see Bialystok, 2016; Paap, 2019 for reviews). Several reviews have highlighted that the issues and inconsistencies with the operationalization of bilingualism and linguistic backgrounds could explain the existing conflicting evidence (DeLuca et al., 2019; Surrain-Luk, 2019). Bilingualism is a complex construct consisting of different elements, however, many studies have singled out one factor and used it as a measure of bilingualism. In the following sections an overview will be given of the findings of the different factors of bilingualism (language proficiency, age of L2 acquisition, language use, interactional context) and their relationship with executive function.

Early works and even some recent studies that investigated the effects of bilingualism on EF have used categorical dichotomy between monolinguals and bilinguals (as if the number of known languages was the only differentiating feature in individuals) and treated both groups as homogeneous. Within such differentiation, classification of an individual as a bilingual was based on one's level of second language proficiency (only sometimes bilinguals were also matched on their age of L2 acquisition) (Bialystok et al., 2004, 2008; Carlson-Meltzoff, 2008; Costa et al., 2009; Prior-Gollan, 2011; Paap-Greenberg, 2013; Antón et al., 2014). This seems to be a reasonable approach, as research into language control mechanism reported better language control abilities for bilinguals with more balanced language proficiencies (Fink-Goldrick, 2015; Mosca-de Bot, 2017; Revniuk-Bátyi, 2023). Thus, if one's second language proficiency is higher, then this person is likely to be very proficient in controlling his/her languages, which could lead to improved EF abilities. This theory was initially confirmed by multiple studies (e.g., Bialystok et al., 2008; Carlson-Meltzoff, 2008; Costa et al., 2009), however, other replication studies with bigger research samples reported no changes in the EF abilities that could be associated with higher L2 proficiency (Paap-Greenberg, 2013; Antón et al., 2014).

Further investigations aimed at discovering other potential variables that could influence that relation. One of the first was the age of L2 acquisition (AoA). Studies

mainly investigated whether there is a difference in the cognitive outcomes in EF for early and late bilinguals. Several studies indicated that bilinguals who started learning an additional language earlier in life had improved cognitive control abilities (e.g., Luk et al., 2011; Soveri et al., 2011; Kramer-Mota, 2015 for older bilinguals). At the same time, other studies failed to confirm these observations (e.g., Gathercole et al., 2014; Kramer-Mota, 2015 for young bilinguals) or reported no significant effects of the AoA on EF (e.g., Duñabeitia et al., 2014).

However, the aforementioned results should be interpreted with caution. The loose operationalization of the age of acquisition (AoA) is the main problem, as the research about the relation between the AoA and executive function analysed the effects of related, but different variables from the AoA (e.g., age of L2 fluency, age of first exposure to L2, etc.) which does not allow to compare such research reasonably. The same applies to other studies that could give the same label of AoA to different variables in operationalization of language experiences (e.g., age of L2 acquisition age of active bilingualism, age of immersion in bilingual environment, age of L2 exposure, etc.) (see Yang et al., 2016 for a commentary). Importantly, it was highlighted that even highly overlapping conceptualization of AoA, like the age of active bilingualism and the age of fluency, do not have substantially high correlations, that can vary significantly for different samples. Ultimately, *“various conceptualizations of AoA are manifested quite differently across various samples. Therefore, it is probable that different degrees of reliability of various indices of AoA explain the divergent outcomes reported in the literature”* (Yang et al., 2016, p. 239).

Another important comment about the operationalization and significance of the AoA as an element of the linguistic background would be related to the comparison of “younger and older starters” in relation to language acquisition and formal education. The popular and scientifically supported belief is that there is a tendency for better language acquisition for those who started acquiring a language at earlier age (Piske et al., 2002; Abrahamsson-Hyltenstam, 2008; Granena-Long, 2013). At the same time some research indicate that if the actual duration of the exposure and/or training in L2 is matched for younger and older starters, the outcomes are similar or even better for the older starters (e.g., Muñoz, 2006). While this conclusion might seem obvious, research on the relation between the linguistic background and the executive function did not take it into consideration and little information about the duration of exposure or use of the language was reported. Finally, it is important to highlight that the significance of differentiating between the age of acquisition and duration of language exposure was reported in studies of their effects on language proficiency. In case of the development of language control abilities, it can be related to the duration of language exposure in the same way as AoA, with no significant need to differentiate between the two.

Arguably, one of the biggest developments in the operationalization of bilingualism happened with highlighting the patterns of language use as an important element of linguistic experience (see Luk-Bialystok, 2013 for review). Initially, researchers were more focused on the language switching aspect of language use, comparing bilinguals who more or less frequently switched languages (e.g., Festman et al., 2010; Prior-Gollan, 2011; Soveri et al., 2011; Yim-Bialystok, 2012). Later, it was highlighted that analysis of the relation between linguistic background and EF should pay more attention to language use habits, as the criteria for evaluating language proficiency are vague (Grosjean-Li, 2013; Luk-Bialystok, 2013; Surrain-Luk, 2019). It can be argued, that while language proficiency is closely related to language control abilities, frequency and manner (e.g., whether languages are used with frequent switching, with bilinguals or monolinguals, etc.) of language use actually represents how the language control is exercised by an individual.

The Adaptive Control Hypothesis (ACH) (Green-Abutalebi, 2013) offers a detailed account for the relationship between language use and cognitive control. According to the ACH, bilinguals can engage with various interactional contexts, “*the recurrent pattern of conversational exchanges within a community of speakers*” (Green-Abutalebi, 2013, p. 516). The ACH differentiates between three contexts:

A single-language context (SLC) in which one language is used in one environment and the other in a second distinct environment.

A dual-language context (DLC) in which both languages are used but typically with different speakers. Switching between languages may occur within a conversation but not within an utterance.

A dense code-switching context (DCS) in which speakers routinely interweave their languages in the course of a single utterance and adapt words from one of their languages to the context of the other.

Compared to earlier studies, the ACH more clearly specifies how the demands on cognitive control processes vary in the aforementioned contexts (Table 1). People, who mainly engage with the single language context, need to control the interferences from the non-target language and maintain an intention to speak the target language, while there is little need to detect cues for shifting into another language, as well as initiate mental processes necessary for it, like task engagement and disengagement. At the same time, people in dual language context need to change between languages more actively, but also carefully control this process, so the control of the interferences from the non-target language would be harder, as both languages are used more frequently and stay more active in one’s mind. Additionally, the aforementioned detection of cues for language change, engagement and disengagement with the tasks of using the target language are now required. Yet, since the process is so controlled, there is no possibility to

employ any opportunistic planning to use the most accessible linguistic representations irrespective of their languages, which is opposite to the situation in dense code-switching context, when language use is less controlled, but unhindered at the same time.

Table 1. Control processes for interactional contexts

Elements of executive function	Single language context	Dual language context	Dense code-switching context
Goal maintenance	actively used	very actively used	not used
Conflict monitoring	actively used	very actively used	not used
Interference suppression	actively used	very actively used	not used
Salient cue detection	not used	very actively used	not used
Selective response inhibition	not used	very actively used	not used
Task disengagement	not used	very actively used	not used
Task engagement	not used	very actively used	not used
Opportunistic planning	not used	not used	actively used

Source: Adapted from Green-Abutalebi, 2013, p. 519

The ACH is a hypothesis and as such, systematic research has been conducted in order to confirm or refute it. This line of research started relatively recently, but there are already several studies that support (e.g., Hartanto-Yang, 2016, 2020; Xie-Dong, 2017; Gullifer et al., 2018; Lai-O'Brien, 2020; Khodos et al., 2021) and contradict (see Paap et al., 2021 for a review) the predictions of the hypothesis. For understanding the appropriate approach to the operationalization of bilingualism, it is important to highlight that individuals do not communicate only in one interactional context, but rather *engage* with each of them to varying degrees (see Kałamała et al., 2020 for a more detailed discussion).

In addition to experiences that are directly related to the linguistic background, psycholinguistic research needs to control other variables that were found to be related to the studied phenomena. In case of the relation between the linguistic background and cognitive control, the latter was found to also be significantly related to the social and economic status (SES) of individuals (Paap et al., 2015). The operationalization of SES could slightly vary among the studies, but it generally

includes the parents' and participants' acquired educational level and family income. It was already highlighted that in some of the earlier research in which SES was not controlled for, bilinguals could have had different SES from monolinguals, which could have been the primary reason for the observed advantages in the executive function, instead of linguistic background (Paap et al., 2015).

2. How to collect data about the linguistic experiences?

The overview of the components of linguistic experience in the previous section makes it evident that a large amount of data on several aspects of linguistic background needs to be collected to more specifically operationalize the concept. Additionally, in order to provide compelling evidence, studies need to engage bigger participant samples (Bakker, 2015). Furthermore, using the same or similar tools would allow to compare the data of different studies.

One of the first tools that was widely used in psycholinguistic research for collecting linguistic background data was the Language Experience and Proficiency Questionnaire (LEAP-Q) (Marian et al., 2007). This tool was used to investigate the relation between linguistic experiences and executive function (e.g., Hartanto-Yang, 2016; Von Bastian et al., 2016; Beatty-Martínez et al., 2019; Cockcroft et al., 2019; Doroud et al., 2020), as it allows collecting data about the history of language acquisition, habits of language use and SES. Even though self-reports on language proficiency could be argued to be unreliable, the reports in LEAP-Q were validated and highly correlated with numerous standardized language proficiency and later research also reported significant correlation between the objective and subjective measures of language proficiency (Paap-Greenberg, 2013; Paap-Sawi, 2014; Paap et al., 2014). The questions about language proficiency and language use in LEAP-Q have numerous response variants and allow for flexible individual reports. This is highly important as it allows to operationalize bilingualism as a complex continuum of experiences.

Luk and Bialystok (2013) suggested that bilingualism should be seen as a continuum and developed the Language and Social Background Questionnaire (LSBQ), which translates individual bilingualism into a continuous variable. Compared to the LEAP-Q, this tool includes deeper inquiries about participant's SES (own and parents' education, parents' occupation and known languages), considering more contexts of language use and importantly, an additional inquiry about language switching habits of participants. Better comparability of research that used the same tool (e.g., Yim-Bialystok, 2012; Bogulski et al., 2015; Janus-Bialystok, 2018; Barker-Bialystok, 2019; DeLuca et al., 2019, 2020; Chung-Fat-Yim et al., 2020) allowed reaching consensus on the need to use more complex cognitive tasks. Another important development is shifting to investigation of the

linguistic background with the attentional control (Bialystok–Craik, 2022), the construct similar to the interpretation of the EF used in the adaptive control hypothesis (including goal maintenance, task engagement and disengagement, holding and manipulation of the content of the working memory, interference suppression and response inhibition).

When it comes to the ACH, LEAP-Q and LSBQ were not designed to evaluate the interactional contexts of an individual. Reportedly, LSBQ was adapted for this purpose in a study by Hartanto and Yang (2016, 2020), but this attempt was not successful at first (Paap et al., 2021 for a comment). Gullifer and colleagues (2018) suggested another approach to evaluating the social diversity of language use – calculation of the language entropy, based on Shannon entropy (Figure 1).

Figure 1. Language entropy formula

$$H = -\sum_{i=1}^n P_i \log_2(P_i).$$

Source: Gullifer et al., 2018, p. 12

Entering the number of the known languages (n) and frequency of use (P_i) of the known languages in a communicative situation, allows calculating the balance of language use in the given communicative situation. It was later suggested that this approach is suitable for the evaluation of engagement with the interactional contexts from the ACH (Gullifer–Titone, 2020). Since only the frequency of language use is required to calculate individual language entropy, so both LEAP-Q and LSBQ should be suitable for it, but the latter collects reports on more contexts of language use.

While more questions about the language use in LSBQ could also be redundant and the scale of LEAP-Q could be enough, the two questionnaires were never compared in this regard.

While the language entropy approach provides a rather elegant solution for measuring individual engagement with various interactional contexts, the report would still be inconclusive when multiple communicative contexts (e.g., language use at home and language use at school) are considered. For example, if it is indicated that for a given individual the use of two languages is almost perfectly balanced at school (e.g., L1 is used 50% of time and L2 is used 50% of time) corresponding to the dual language context, while at home L1 is predominantly used (e.g., L1 is used 80% of time and L2 is used 20% of time) corresponding to the single language context – it would still not be a compelling indication that the individual engages with SLC and DLC similarly, because the time spent in these contexts is not indicated. If each entropy score had its own weighting from the amount of time spent

in each communicative context, it would provide a more accurate data on the engagement with the interactional contexts and language use in general.

While LEAP-Q and LSBQ do not ask these questions, the latest iteration of the Language History Questionnaire (LHQ3) does (Li et al., 2020). Therefore, LHQ3 in its current form, is the most up-to-date tool that meets the aforementioned requirements for the collection of data about the linguistic background. At the same time, with relatively small updating, LSBQ and LEAP-Q could become equally suitable for the same purpose. Finally, all questionnaires would require adjustments to their automatic data transformation system to account for the processing of the weighted language entropy values.

An additional advantage of the LHQ related to the questions of language use is the way these questions were selected for the questionnaire. The authors highlighted that the original version of the LHQ is “*based on the most commonly asked questions in previous published studies*” (Li et al., 2020, p. 938). While the questions about the language use designed for the LSBQ and LEAP-Q are entirely reasonable, there are no wider discussion or research reported that supported the choice of those questions. The questions about the contexts of language use and their format all developed through different versions of the LHQ, but it should be noted that the authors do not explicitly indicate how the new questions in the LHQ2 and LHQ3 were selected.

The issue of the questions to be asked is important as the validity of the inquiry about the linguistic experiences directly depends on it, i.e., on what grounds the concept is operationalized. The Delphi consensus survey conducted by De Cat and colleagues (2023) provided data from over a hundred professionals in the language-related fields, “*with the aim of informing the creation of a modular tool for quantifying bilingual experience and achieve consensus between different groups (researchers and practitioners)*” (De Cat et al., 2023, p. 113). With the help of such research, we now have more reliable information on the appropriate approach to collecting data about the linguistic experiences. Yet, it is important to consider that this Delphi consensus survey mostly asked for feedback on the questions related to children’s linguistic experiences. Additional investigation about the approach to collecting data from adults could have been useful, such as, reflection on the importance of the reports about language use in working places, administrative establishments or about more informal but also regular activities, like shopping, etc.

Additional conclusion from the work by De Cat and colleagues (2023) is related to the differentiation between the exposure to languages and speech production (usually labelled as „language use”). While there is no specific question asking if it is reasonable to break the questions into these two separate “sections”, the questions themselves are formulated in the ways that distinguish between use and

exposure (e.g., 8. Exposure and use should be measured (for each language); 12. The child's digital language exposure and use needs to be measured (e.g., Internet, social media, gaming)). In case of investigating the relation between the linguistic background and executive function, this differentiation might be of particular importance, as the said relation is based on the exercising of language control, which evidently varies for language production and perception (Reynolds et al., 2016; Mosca-de Bot, 2017; Revniuk-Bátyi, 2023 for review). The investigation of the quality of language input would also greatly supplement the reports on exposure to languages, which reporters of the consensus agreed on as well.

Finally, the aforementioned conclusions from the study by De Cat and colleagues (2023) should be taken into consideration and implemented with caution, as the data collection tool including all of the corresponding questions would already be challenging to fill in. The comments from the participants of the consensus repeatedly question the viability of including the detailed reports about the tendencies of language use and exposure to it, indicating that questionnaire-takers are likely to find some questions too hard to answer and the entire questionnaire would become too big and exhausting to fill in. The modularity of the questionnaire might allow alleviating these challenges, but then the question comes about what should be considered the "core" part of the questionnaire and what questions and sections are optional. As was concluded by the authors, "*empirical investigation will be necessary to identify the optimal level of detail to be targeted by bilingual experience questionnaires*" (De Cat et al., 2023, p. 123).

3. Current issues in the study of linguistic experiences and executive functions

As it became clear, several data collection tools are available to measure the bilingual language experience, and a further question is how to analyse the obtained data. Data analysis approaches are various (e.g., Antón et al., 2014; Pot et al., 2018; Hartanto-Yang, 2020; Kheder-Kaan, 2021) which posits challenges for comparing and interpreting the results (see Surrain-Luk, 2019 for review). When it comes to replication studies with minimal/no variation from earlier research, they frequently (but not always) reported the data that contradicted the original research, while having higher reliability due to engaging more participants than the original work (see Paap et al., 2015). That is why the recent trends in research of the relation between the linguistic background and the executive function are the revision of methodological approaches (specifically tools for collecting data and approaches to analysing it) and research practices (Bialystok-Craik, 2022; De Cat et al., 2023).

Once again, it is the approach to the operationalization of language experiences that is being criticized. In addition to the variety of data that should be collected, it

was explicitly highlighted that researchers need to move from monolingual and bilingual dichotomy towards analysing the spectrum of individual language experiences (DeLuca et al., 2019). Generally, if standardized tools are used for collecting data on linguistic experiences (like LEAP-Q, LHQ or LSBQ), it is naturally more appropriate to examine language experiences as a continuum, which has already been done (e.g., De Cat et al., 2018; Beatty-Martínez et al., 2019; Hartanto-Yang, 2020; Kalamala et al., 2020; Lai-O'Brien, 2020; Thanissery et al., 2020). However, it still not clarified why studies using the same or similar standardized tests of linguistic background and similar measures of the executive function yield conflicting results.

Another small comment for the existing and future works would be on the consideration of other variables of the individual linguistic experiences in addition to the interactional contexts of the ACH. To the most part, they are included in models for regression analyses and latent variable analyses as covariates. At the same time, according to the ACH, "*We simply note here that for speakers in single- and dual-language contexts an increase in proficiency is most likely associated with increased skill in the control of interference. The same may only be true for those in dense code-switching contexts until they can begin to use their knowledge of the two languages opportunistically*" (Green-Abutalebi, 2013, p. 525). Indeed, as was mentioned before, research indicates that higher proficiency in non-native languages (usually equates to better balance in proficiencies of the known languages) is associated with better language control abilities. Therefore, engagement with the interactional contexts and language proficiency should both have a relation with the executive function and according to ACH, "*The relationship between proficiency and specific adaptive changes as a function of interactional context is unlikely to be straightforward...*" (Green-Abutalebi, 2013, p. 525). Considering how a recent study showcased that the *interactions* between language switching and language proficiency have significant influence on the relation with the performance in the Simon task (Kheder-Kaan, 2021), it could have been reasonable to analyse how the interaction of proficiency with interactional contexts affects the relation of these elements of linguistic background with the executive function.

Final, but a highly important issue of this research topic is a lack of the theory-driven research (see Paap et al., 2015 for a review). While linking the concepts of linguistic experiences and executive function *seems plausible*, there were no theory in the area of bilingualism to elaborate on this relationship when the research on the bilingual advantage raised into prominence (Paap et al., 2015). The adaptive control hypothesis can be used as such theoretical foundation, but there is still no coherent explanation of the mechanism of the cognitive transfer from language control to executive function (Hartsuiker, 2015; Paap et al., 2015; Treccani-

Mulatti, 2015). At the same time, if the ACH is partially inconclusive, even the null results have already advanced our understanding of the relation between the linguistic experiences and the EF. For example, theory-driven and more systematic approach to the operationalization of the linguistic experiences highlighted the overlooked issue of using unreliable measures of the inhibition element of the executive function (see Kalamala et al., 2020; Paap et al., 2021 for comments).

Another example would be the case of the neurolinguistic studies of the relations between the linguistic experiences and brain areas that are associated with the executive function (DeLuca et al., 2019). While neural evidence indicates significant relation, behavioural data from the same studies show no evidence for such relation (Paap et al., 2015; DeLuca et al., 2019). With systematic operationalization of the linguistic experiences, researchers pay attention to other variables that could influence the data, but used to be overlooked, like cognitive demands of the tasks for measuring the executive function (e.g., Yang-Yang, 2017; Barker-Bialystok, 2019; Jiao et al., 2019; Sanchez-Azanza et al., 2020). Another line of explanation suggests that language control develops into its own cognitive system, independent from non-linguistic cognitive control, which could explain the null findings about the relation between the two (Paap, 2019). Such conclusions could not be obtained without convincing, more widely accepted evidence from theory-driven studies, so the development of new and further elaboration of the existing theories is likely to be the main drive of the new research on the relation between the linguistic background and the executive function.

4. Conclusion

Operationalization of language experiences has become a very complex, but evidently manageable task. Movement towards using standardized questionnaires for collecting the information about linguistic background is a positive tendency that could allow for better comparability between studies and yield to more reliable, convincing research results. At the same time, the field of psycholinguistics would benefit from continuing the critical and attentive reviews of the existing research tools. Recent efforts in continuing the discussion already provide new insights into an existing demand for data for both production and exposure to languages (De Cat et al., 2023).

In case of research of the relation between the linguistic experiences and the executive function, the question of proper use of the existing tools is of top priority. As of now, the research need to carefully specify the theory that they investigate and analyse the data accordingly. There is still a high demand for theory-driven research and even if more coherent theories were suggested (e.g., the adaptive control hypotheses), the approaches to investigating those theories are still being discussed

and criticized (e.g., Gullifer–Titone, 2020; Paap et al., 2021). Ultimately, coherent theories would indicate what elements of complex and varying individual linguistic experiences are relevant for the question at hand, thus refining older theories and formulating new ones would likely to be the most important development for the operationalization of linguistic experiences in this field of research.

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The operationalization of bilingual linguistic experience and its relationship with executive function

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Research of the relation between linguistic experiences and the executive function have been a hot topic in the field of psycholinguistics for over two decades. Considerable body of studies have provided both supporting and challenging evidence for the existence of such relation. The final answer about the relation between the linguistic experiences and the executive function has not been obtained yet, due to reconsiderations of the established methodological approaches and new theories still being developed, which challenge the validity of earlier findings. This article is an attempt to summarize and explain current trends in this line of studies, specifically focusing on the issue of operationalization of linguistic experiences. Bilingualism and multilingualism are complex constructs, composed of multiple elements that can have unique, independent effects on cognition, including language proficiency, manner and duration of language acquisition, current tendencies of language use. Earlier

studies had a tendency to focus on a single element of language experience for categorical distinction between monolinguals and bilinguals, converging the great variability in the latter under a single category. Each element of linguistic experience has to be accounted for and carefully operationalized in a way that would allow reasonable comparison between different research on the topic. In addition to exploring the effects of various elements of linguistic experiences on cognitive control, interactions between those experiences also demand attention, which have been largely overlooked. Finally, each study has to be backed up by a solid theoretical background, which was argued to be a problem for the research of the relation between the linguistic experiences and the executive function, but has great potential for resolving the inconsistencies in research findings. Not all experiences with languages require effortful cognitive processing and adaptations, and even if some might, a comprehensive theory is required to explain how cognitive adaptations for language use can be generalized for other domains of cognition.

Keywords: *linguistic experiences, executive function, bilingualism, multilingualism, language proficiency, language acquisition, tendencies of language use.*

Операціоналізація двомовного мовного досвіду та його зв'язок із виконавчою функцією

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Дослідження зв'язку між мовним досвідом і виконавчою функцією є важливою темою в галузі психолінгвістики вже більше двох десятиліть. Результати досліджень показали як підтверджувальні, так і заперечливі докази існування такого зв'язку. Остаточної відповіді про зв'язок між мовним досвідом і виконавчою функцією ще нема через перегляд усталених методологічних підходів і нових теорій, які у процесі розроблення, що ставить під сумнів достовірність попередніх результатів. Стаття є спробою узагальнити та пояснити сучасні тенденції в цьому напрямі досліджень, особливо зосереджуючись на питанні операціоналізації мовного досвіду. Білінгвізм і багатомовність є складними поняттями, що складаються з багатьох елементів, які можуть мати унікальний, незалежний вплив на мислення, включаючи рівень володіння мовою, спосіб і тривалість оволодіння мовою, поточні тенденції використання мови. У попередніх дослідженнях була тенденція зосереджуватися на одному елементі мовного досвіду для категоріального розрізнення між одномовними та двомовними людьми, зводячи велику варіативність останніх під одну категорію. Кожен елемент мовного досвіду має бути врахований і ретельно операціоналізований таким чином, щоб забезпечити прийнятне порівняння між різними дослідженнями на цю тему. Вивчення впливу різних елементів мовного досвіду на когнітивний контроль, взаємодії між цими елементами вимагають уваги, що здебільшого ігнорувалось. Наостанок, кожне дослідження має бути підкріплено надійною теоретичною основою, яка, як стверджувалося, є проблемою для дослідження зв'язку між мовним досвідом і виконавчою функцією, але має великий потенціал для вирішення невідповідностей у результатах дослідження. Не кожен досвід взаємодії з

мовами потребує старанного когнітивного опрацювання та адаптацій, і навіть якщо деякий досвід дійсно того потребує, необхідна комплексна теорія для того, щоб пояснити, як когнітивні адаптації для використання мови можуть узагальнюватися в інших сферах мислення.

Ключові слова: мовний досвід, виконавча функція, білінгвізм, багатомовність, володіння мовою, засвоєння мови, тенденції використання мови.

A kétnyelvű nyelvi tapasztalat operacionalizálása és kapcsolata a végrehajtó funkcióval

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A nyelvi tapasztalatok és a végrehajtó funkció kapcsolatának kutatása több mint két évtizede népszerű téma a pszicholingvisztika területén. Számos tanulmány szolgált egyaránt alátámasztó és megkérdőjelező bizonyítékokkal egy ilyen kapcsolat létezésére. A nyelvi tapasztalatok és a végrehajtó funkció kapcsolatára a végleges válasz még nem született meg a kialakult módszertani megközelítések újragondolása, és a még kidolgozás alatt álló új elméletek miatt, amelyek megkérdőjelezzik a korábbi megállapítások érvényességét. A jelen tanulmány arra tesz kísérletet, hogy összefoglalja és megmagyarázza e kutatási terület jelenlegi tendenciáit, különös tekintettel a nyelvi tapasztalatok operacionalizálásának kérdésére. A kétnyelvűség és a többsnyelvűség összetett fogalmak, amelyek több elemből állnak, és ezek mind egyedi, független hatással lehetnek a megismerésre, beleértve a nyelvtudást, a nyelvvelsajátítás módját és időtartamát, a nyelvhasználat jelenlegi tendenciáit. A korábbi kutatások hajlamosak voltak a nyelvi tapasztalat egyetlen elemére összpontosítani az egynyelvűek és a kétnyelvűek közötti kategorikus megkülönböztetés érdekében, egyetlen kategória alá konvergálva az utóbbiak nagy változatosságát. A nyelvi tapasztalat ezen elemeinek mindegyikét szükséges figyelembe venni és gondosan operacionalizálni oly módon, hogy az lehetővé tegye a témával kapcsolatos különböző kutatások észszerű összehasonlítását. A nyelvi tapasztalatok különböző elemeinek a kognitív kontrollra gyakorolt hatásának feltárása mellett az ezen élmények közötti interakciók is figyelmet igényelnek, amelyeket eddig jórészt figyelmen kívül hagytak. Végül minden egyes tanulmányt szilárd elméleti háttérrel kell alátámasztani, amely a nyelvi háttértapasztalatok és a végrehajtó funkció kapcsolatának kutatása szempontjából problémát jelent, de nagy potenciállal rendelkezik a kutatási eredményekben rejlő ellentmondások feloldására. Nem minden nyelvi tapasztalat követel erőfeszítést igénylő kognitív feldolgozást és adaptációt, de ha egyesek mégis, átfogó elméleti háttérre van szükség annak megmagyarázásához, hogy a nyelvhasználathoz szükséges kognitív adaptációk hogyan általánosíthatók a megismerés más területeire.

Kulcsszavak: nyelvi tapasztalatok, végrehajtó funkció, kétnyelvűség, többsnyelvűség, nyelvtudás, nyelvvelsajátítás, nyelvhasználati tendenciák.