



Variables Influencing Executive Functions

Shaji SR¹ and Abhishek BP^{2*}

¹Speech Language Pathologist, Centre for Speech and Language Disorders in Children, Adults and Senior Citizens(C-SLD), AIISH, India

²Assistant Professor in Language Pathology, Centre of Speech-Language Sciences (C-SLS), AIISH, India

***Corresponding author:** Abhishek Budiguppe Panchakshari, Assistant Professor in Language Pathology, Centre of Speech-Language Sciences (C-SLS), AIISH, Mysuru, India, Email: abhishekbp@aiishmysore.in

Received Date: October 10, 2024; **Published Date:** October 23, 2024

Abstract

Executive function refers to a cluster of cognitive processes like working memory, cognitive flexibility, and inhibitory control. These skills are found to be pivotal for anchoring goal directed behaviours. Executive function is influenced by variety of variables including bilingualism and aging. Research indicates that bilingualism can facilitate executive functions as bilinguals are required to mentally switch or juggle between the languages they know fostering cognitive flexibility and response inhibition. Conversely aging can impede the executive functions affecting the cognitive flexibility and other important components related to executive function. The current article explains the intricate relationship between these variables and executive function per se.

Keywords: Cognitive Flexibility; Cognitive Processes; Response Inhibition; Decline; Senility; Senescence

Introduction

It is the possession of language which distinguishes humans from other animals. Language is the means of communication by which members of a particular community interact with each other to convey their needs, thoughts, opinions, and feelings. Language is a social tool, a socially shared code or conventional system for representing concepts through arbitrary symbols and rule-governed combinations of those symbols [1]. A few studies have investigated the relationship between language and executive functions. It is assumed that language control functions through the same mechanisms which regulate the executive control mechanisms. These include aspects such as task planning and its execution, task switching, conflict monitoring and conflict resolution. It has been established that executive functions play a dynamic role during the act of speaking by helping the speaker to choose the correct word against the other competing words. It helps prevent wrong word generation [2]. Executive functions also

help the listeners to focus on the meaning and ignore the preconceived notions, thereby facilitating the selection and grasping of relevant information from speech output [3]. It is also utilized during sentence comprehension in monitoring and selecting appropriately among competing sentence representations [4]. Bilingualism is a common variable influencing executive function.

Most of the researchers have defined bilingualism based on language use. Bilingualism is defined as an individual's usage and proficiency in at least two languages, which may change depending on the opportunities to use the language and exposure to other users of the language. Bilinguals are defined as those who need and use two or more languages or dialects in their everyday lives [5]. Bilinguals avoid wrong language intrusions by using language control mechanisms that help in regulating the two languages and may aid in inhibiting the incorrect language [6]. Aspects such as inhibitory control, working memory, problem-solving

and decision-making are important for these functions. Domain-general executive control mechanisms that include concentration on a single task, refraining from extraneous actions through inhibition, and recognizing conflicting inputs or situations are particularly crucial for bilingual language control [7]. Executive functions aid in alternating between two languages in bilinguals. Bilinguals exhibited faster and better performance in cognitive flexibility and inhibitory control tasks [8]. It has been found that controlled processing is done more efficiently by bilinguals. Bilingual advantage has also been reported on tasks that demand control of attention over competing cues, i.e., interference suppression [9]. Also, few studies conclude that bilingualism helps offset the loss due to aging in certain executive functions. Aging is another potential variable influencing executive functions.

Several studies have elucidated the notion that language abilities decrease with age. One of the most commonly reported deficits is in the domain of word retrieval [10]. Such deterioration has been reflected in the task of confrontation naming in older adults [11]. Tip-of-tongue experiences where the individual is unable to produce the word but absolutely sure that he knows the particular word are also reported to be more in older age groups compared to the younger groups. Age-related declines in both propositional content and syntactical complexity have been observed. As one ages there is a gradual deterioration in cognitive abilities. Executive functions are one such domain that exhibits deficits with age. Studies that employed various tasks such as Stroop, Flanker, Digit Span, and trial-making tasks to tap executive functions have shown significant differences in the performance of older age groups, i.e., a decline in performance when compared to the younger age groups. Age-related changes found in executive control are linked to alterations seen in the prefrontal cortex due to aging [12]. Executive functions are found to be important for all the activities in our daily life. This executive function is vulnerable to vary in bilinguals and aged population hence it becomes important to understand the effects exercised by these variables on executive functions in effective intervention.

Conclusion

The executive function is found to be influenced by a number of variables. Out of all the variables, bilingualism and aging are considered to be the major two variables influencing executive function while the former is considered to have a facilitator or positive effect, the latter is assumed to exert a negative influence on executive function. The current study accounts for these effects and documents the specific effect exerted by each of these variables.

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