SoCul: International Journal of Research in Social Cultural Issues
Vol. 04, No. 03; June 2024
ISSN: 2798-4672
Journal Homepage: https://ejurnal.unima.ac.id/index.php/socul

Investigating the Relationship between Language and Cognition and Its Implication on English Language Teaching (ELT)

Herminus Efrando Pabur[1*], Rizqi Claudia Wardani[2], Jenerio Michal Mokalu[3], Jennie Posumah[4]
[134)] English Education Department, Universitas Negeri Manado, Indonesia
[2)] Universitas Pendidikan Muhammadiyah Sorong
[*)] Corresponding Author: efrandopabur@unima.ac.id

Article History
Summitted : January 31th, 2024
Revised : May 12th, 2024
Accepted : May 28th, 2024

KEYWORDS
Language,
Cognition
English language teaching

ABSTRACT
There is close connection between language and cognition, in which cognition helps human to acquire language and learn a new language. This present study is conducted to explain the relationship between language and cognition, specifically on the aspects of cognition. This study is also conducted to investigate the implication of the connection between language and cognition on English Language Teaching. This study is a qualitative study with library research method, in which the data sources are the relevant literature such as books, academic papers, and articles from academic journals. Data collection is conducted by collecting and sorting the relevant sources and literature from online database: Scopus, Google Scholar and Sinta. The data obtained are analyzed systematically using the content analysis technique in which the relevant data are quoted to support the core idea of this study. The findings show that there is a close connection between language and cognition, especially how language is closely related to the aspects of cognition. The cognition and its aspects help human in acquiring a language, using the language and evaluating the use of the language. The same also goes to acquiring English as a second or foreign language. It means that there are several implications of the connection of language and cognition toward English Language Teaching (ELT): (1) English language teaching should consider learners' cognition; 2) English language teaching process must be able to attract students' attention; 3) English language teaching must involve memory, reasoning and thinking processes; and 4) English teaching should help students to improve their speaking skills as the observable aspects of cognition.

INTRODUCTION

The relationship between language and cognition is a fascinating topic that has drawn the interest of linguists, psychologists, and neuroscientists alike (Bellugi et al., 2013; Perlovsky, 2009; Majid et al., 2004; Jarvis & Pavlenko, 2008). Language, at its core, can be defined as a tool for human communication (Tylen et al., 2010). It facilitates interaction, whether in personal settings or within groups. However, the primary role of language in human life goes beyond mere communication. Language also serves a social function and is deeply intertwined with culture, highlighting its broader significance (Sanden, 2016; Wijaya & Nasution, 2018). Some linguists argue that language is uniquely human (Chomsky, 1999; Hockett, 1959; Cong & Liu, 2014). This perspective is based on the fact that language is a human invention, deeply embedded in all aspects of human life. Consequently, another view emerges, asserting that language is an integral part of human culture. Observations of daily life reveal a close relationship between language and culture (Bergroth & Hansell, 2020; Boas, 1942; Whorf, 1997). For instance, in Indonesia, asking about someone's marital status during a first meeting is considered normal, whereas in England or the USA, it may be perceived as impolite. This example

highlights how culture influences language expressions. It is also essential to note that expressions differ significantly between spoken and written forms.

Language can be expressed in spoken, written, or even symbolic forms. Among these, spoken language is the most widely used (Davis & Johnsrude, 2003). While many languages have a spoken form, not all possess a written counterpart (Cienki, 2015), emphasizing the prominence of spoken communication. However, the focus is not solely on the spoken form but rather on the connection between language and cognition. Simply put, mastering or acquiring language is impossible without cognitive processes occurring in the brain. This clearly indicates a fundamental relationship between language and cognition. From a Darwinian perspective, language is considered a product of cognition (Pinker, 2003; Spolsky, 2002). This view posits that language would not have emerged through natural selection alone but was made possible by a phenomenon known as reciprocal altruism. This concept highlights the sharing of information to enhance a group's ability to survive natural selection (Fennell, 2006; Schino & Aureli, 2009). Darwinian theory suggests that reciprocal altruism was the foundation of communication and marked a critical milestone in the development of language in human life (Trivers, 2006). Over time, this cooperation facilitated the formation of social structures.

Another essential aspect of this study is cognition, as it directly relates to the interplay between language and cognition. Cognition can be broadly defined as the human mental process (Allen, 2017; Duncan & Barrett, 2007), enabling individuals to think, remember, and make judgments. This complex process involves the intersection of linguistics, psychology, and neuroscience, with its primary focus being its occurrence within the brain. Some psychologists equate cognition with the thinking process, which is understandable given that it encompasses various elements such as awareness, perception, reasoning, and judgment (Butterworth, 1993; Goswami, 2014). Additionally, some theories highlight cognition as the process of understanding concepts or theories, aligning with the notion that cognition is fundamentally the act of knowing.

Cognition, as a mental process occurring in the human mind or brain, encompasses several key aspects: attention, perception, memory, reasoning, judgment, thinking, and speaking (Holyoak & Morrison, 2005). These cognitive functions are constantly at work in human life, often operating below the level of conscious awareness. For instance, consider someone saying, "This picture is beautiful." The brain begins by focusing attention on the picture, forming a perception that is stored in memory. Based on past experiences, knowledge, and perceptions, the brain engages in reasoning, leading to a judgment about the picture's beauty. This intricate process, encapsulated within the act of thinking, ultimately culminates in the expression of thoughts through speech. Remarkably, this entire sequence occurs almost instantaneously, so seamlessly integrated into daily life that we are often unaware of its complexity.

Numerous studies have explored the relationship between language and cognition. Majid (2018), from a cognitive science perspective, found a strong connection between the two. Similarly, Wang (2013) highlighted this relationship, emphasizing its role in bilingualism, applied linguistics, and second language acquisition. Perlovsky (2011) also studied the relationship between language and cognition, with a focus on how cognitive processes facilitate language acquisition. Unlike prior studies, the current research focuses on specific components of cognition and their interaction with language, limiting its scope to the implications for English Language Teaching (ELT).

Knowing the strong relationship between language and cognition, the purpose of this study is to investigate it, with a particular emphasis on the various components of cognitive functioning. It aims to explain how this relationship affects English Language Teaching. This study aims to improve readers' comprehension of the relationship between language and cognition, specifically in terms of cognitive processes. It also aims to contribute to the ELT field by assisting English teachers in recognizing the critical role of cognition in language teaching and learning, resulting in better instructional methods and student outcomes.

METHOD

The present study used qualitative research methods, specifically library research. The use of library research allowed the researchers to examine the relationship between language and cognition by gathering, assessing, and synthesizing data from multiple sources (Adlini et al., 2022; Bowen, 2009). Library research collects secondary data, such as books, journal articles, dissertations, reports,

archives, and other documented resources, to answer research questions or investigate a certain issue. Library research is non-empirical since it relies on secondary sources rather than collecting data directly through surveys, trials, or interviews (George, 2008).

The sources used for the present study were taken form credible online databases such as Scopus, Google Scholar and Sinta (Science and Technology Index). Several books related to language and cognition were also used to enrich the data for this study. All the sources chosen by the researchers were made sure related to the topic of language and cognition. The collected data were organized systematically, so the key theme can be identified. The data were synthesized to get insights from various sources to address research questions. The analysis focuses on relevant quotations and information to provide comprehensive answers to the research questions.

FINDINGS

Language

Language can be considered a fundamental human property, as it is both invented and utilized by humans in virtually every aspect of their lives (Pinker & Jackendoff, 2005; Pinker, 2003). At the same time, language is deeply embedded in human culture, as it is passed down from generation to generation, adapting and evolving within different cultural contexts (Majid & Levinson, 2011; Mazari & Derraz, 2015). The concept of language itself is multifaceted, with Amberg and Vause (2009) defining it as a rule-based system of signs. Importantly, they argue that language rules are not imposed by an authority but are instead conventions—unspoken, unofficial rules accepted and followed by members of a community, often without conscious awareness. This highlights that language is an essential part of human culture, rooted in social conventions. Crystal (1987) further emphasizes the significant role of language, noting that it uniquely captures the breadth of human thought and endeavor. Language profoundly affects our daily lives, serving as the medium through which we express ourselves in all activities. It permeates every sector of human existence, influencing how we teach, solve problems, and even engage in conflict. This underscores the powerful nature of language as an essential human property (Cipollone et al., 1998).

Language can be viewed as a product of human mental activity. Qui (2014) presents a comparison between Aristotle's and Chomsky's theories of language, highlighting a shared emphasis on the role of the human mind in the creation of language. According to Qui, both philosophers agree that the human mind plays a crucial role in language, but they differ in their focus: Chomsky stresses the syntax of language, while Aristotle emphasizes the semantic scope that the human mind bestows upon it. As Qui (2014) states, "Both Aristotle and Chomsky emphasize the contribution made by human mind to human language, but Chomsky stresses the syntax of human language decided by human mind, Aristotle stresses the semantic scope of human language endowed by human mind." This comparison underscores that language, as a product of human mental activity, is a unique human ability, akin to walking—something humans are not taught but naturally acquire during development. Language acquisition, like walking, is a natural process that emerges as humans develop.

Rodman and Fromkin (1993) assert that in some cultural traditions, language is central to defining humanity. They provide the example of a belief in certain African cultures where a newborn is initially seen as a *kuntu* (a thing) rather than a *muntu* (a human) until they acquire language. This highlights the profound influence language has on human development. Cipollone et al. (1998) further emphasize that language is a rich and varied human ability, reinforcing its status as a fundamental property of the human mind. Lenneberg (1967) adds that language is a natural ability, embedded in the human brain, and that our species-specific capacity to acquire and use language is an intrinsic feature of the natural world.

There is also a common misperception that language exists solely as a sign system or as a tool for producing utterances. McWhorter (2004) explains that language includes both aspects: "By language, we do not mean solely words, but the grammar that we use to put them together to produce utterances that reflect our impressions of our lives, experiences, and environment, as well as enable us to affect people and events around us." This concept highlights that language is more than just a symbolic system; it is also a medium of expression, reflecting human experiences and impacting our environment. As a result, language may be viewed as a human property formed by both symbols and utterances, and it serves as an essential medium for human communication.

Cognition

Cognition is generally understood as a mental process that encompasses a variety of activities essential to human life, such as memorizing, problem-solving, remembering, and thinking (Karimipour & Niroo, 2015; Lupien et al., 2007; Snyder & Snyder, 2008). According to the American Heritage Dictionary of the English Language (4th edition, published in 2000), as cited in Brandimonte et al. (2006), cognition is defined as “the mental process of knowing, including aspects such as awareness, perception, reasoning, and judgment,” and as “that which comes to be known, as through perception, reasoning, or intuition; knowledge.” This definition suggests that cognition is fundamentally connected to the process of knowing, which involves activities such as perceiving, reasoning, and forming judgments.

Brandimonte et al. (2006) further distinguish two important aspects of cognition: first, as a process—cognition as something that humans (and some animals) engage in—and second, as a product—cognitions as the mental representations that surface to consciousness when we perceive, reason, or form mental images. As a process, cognition refers to the mental activity involved in processing information and knowledge. This process is complex, requiring the management of information through activities such as memorizing, perceiving, and reasoning. Even what we often consider simple activities, like thinking or remembering, involve intricate brain functions. These processes engage many neurons and occur through complex neural interactions. Neuroscience provides insights into how the brain reacts when it processes information or knowledge, illustrating the complexity and depth of cognitive functions. Through this lens, cognition can be understood not only as a mental process but also as the product of sophisticated brain activities that enable us to acquire, store, and manipulate knowledge.

Cognition can also be understood as a product, the outcome of the mental processes that precede it. Certain mental activities must be manifested in concrete actions. For example, problem-solving requires a physical manifestation of the mental process. Consider the scenario where we are in a dark room. Our brain recognizes the darkness and concludes that we need to turn on the light. At this point, we are still in the realm of cognition as a mental process—recognizing the darkness and making the conclusion. However, when we take action and actually turn the light on, cognition transitions into a product. The action of turning the light on is the physical manifestation of the mental process that preceded it. This example illustrates that cognition is not merely confined to the brain but extends to our actions in daily life.

Brandimonte et al. (2006) further elaborate on this concept, stating that “Cognition is not merely a process, but a ‘mental’ process… cognition indeed refers to the mental process by which external or internal input is transformed, reduced, elaborated, stored, recovered, and used. As such, it involves a variety of functions such as perception, attention, memory coding, retention, and recall, decision-making, reasoning, problem-solving, imaging, planning and executing actions. Such mental processes involve the generation and use of internal representations to varying degrees, and may operate independently (or not) at different stages of processing” (Brandimonte et al., 2006, p. 3). This explanation highlights that cognition requires both input and output—stimuli and responses—and involves multiple functions that work together. It is also interesting to note that cognition may operate independently at different stages of processing. Some cognitive activities occur automatically, without our conscious awareness. For instance, when we hear our name called, we automatically turn to look at the person calling us. This action occurs so quickly that we often do not notice the cognitive steps involved. Such automatic activities suggest that, to some degree, cognition operates autonomously as a result of learned behavior, reinforcing the idea that cognition is influenced by social and cultural factors.

In some contexts, cognition is closely linked to thinking about "reality," which refers to the stimuli encountered in our daily activities, such as seeing, hearing, and perceiving. Ormrod (2011) defines cognition as “the various ways in which people think about what they are seeing, hearing, studying, and learning,” and the specific activities involved are referred to as cognitive processes. This definition emphasizes that cognition involves managing the information we encounter, and the result of this process is called cognitive processes. In essence, cognition is the process of managing and organizing information. Ormrod’s perspective on cognition aligns with the views of Brandimonte et al. (2006), who also agree that cognition involves mental processes.

Guenther (1997) extends this idea by suggesting that mental processes reflect physical processes, with the brain acting as the physical organ involved in cognition. He states, “In the modern world, the study of human cognition is a science. The essential assumption made by cognitive scientists is that cognitive phenomena, such as reasoning and remembering, are caused by orderly and self-regulating physical processes intrinsic to the arrangement of matter and energy in the brain.” The key point here is the arrangement of matter and energy in the brain. The brain receives vast amounts of information, and through an "amazing" filtering process, it determines the appropriate response to stimuli. This process of information management in the brain is what we refer to as human cognition.

Since cognition involves thinking processes, it can also be understood as the process of understanding something. Greno et al. (1997) highlight cognition as the understanding of concepts and theories. However, understanding is not the same as simply knowing something. Understanding goes beyond knowing; it requires a higher level of comprehension, including knowing how something works and understanding the effects of certain actions or events. Cognition also relies on fundamental abilities, such as reasoning, language comprehension, and planning. These abilities are essential for effectively processing and responding to the information that we encounter.

Aspects of Cognition

Cognition refers to a mental process that some psychologists describe as the act of knowing. As a function of the brain, cognition encompasses various complex activities, including attention, perception, memory, reasoning, judgment, thinking, and speaking. These interconnected processes play a fundamental role in how we acquire, process, and use knowledge.

Attention

Attention is a fundamental step in the cognitive process of humans. Bodenhausen and Hugenberg (2003) emphasize that attention is the first step in perception, likening it to a "spotlight" that directs focus on specific stimuli. In this sense, attention can be understood as the process of directing stimuli to the brain, enabling perception to occur. However, attention is not a passive act of merely receiving stimuli; rather, it involves selecting and prioritizing certain stimuli over others. Not all activities in daily life capture our full attention; only those that are particularly salient or significant to us draw more of our focus, while others receive only a smaller portion of our attention.

It is essential to understand that attention serves as a sign of human consciousness. Brigard and Prinz (2010) suggest that attention is "sufficient for consciousness, but not necessary," arguing that attention can be an indicator that a person is conscious, but it is not the only sign. Their statement is grounded in the commonsense approach to cognition, which asserts that while attention plays a role in consciousness, other actions, such as speaking or playing football, can also indicate that a person is conscious. The key takeaway is that attention functions as a mechanism for receiving and processing stimuli through sensory input (such as hearing and sight), but it is not the sole determinant of human consciousness.

Perception

Perception, at its core, is how we interpret and make sense of the world around us, and it varies from person to person. While attention is often considered the first aspect of cognition, some psychologists, including Bodenhausen and Hugenberg (2003), view perception as the initial step in the cognitive process. They assert that "perception is the first step in social cognition," highlighting that our cognition begins with how we perceive things. The way we perceive stimuli significantly impacts our judgments and subsequent actions. Bodenhausen and Hugenberg (2003) further define perception as the interface between the outer world and our internal mental processes. They explain, "Social targets and the contextual stimuli of the outer environment create signals (visual, auditory, etc.) that can be sensed, and the perceiver receives these signals and converts them into psychologically meaningful representations that define our inner experience of the world." This definition underscores two key points. First, perception is rooted in attention and experience: it begins with the stimuli we attend to and the experiences we have. Second, perception is a process through which we interpret the world, shaping our thoughts and inner experience. For example, when someone mentions "a bottle," one

person may envision a plastic bottle, while another might think of a glass bottle, demonstrating how perception influences our understanding and mental representation of the world.

Andrej Démuth, like Bodenhausen and Hugenberg, also posits that perception is the starting point of cognition. Démuth (2013) stated, “Perceptions as objects which form the content and diversity of the world, but also the starting point and the source of any sensual or intellectual cognition will therefore be the subject of our thoughts.” This aligns with Bodenhausen and Hugenberg's view that perception is the key to understanding the world and plays a central role in cognition. Démuth emphasizes that perception is not only the medium through which we interpret the world but also the source of our cognitive processes. He argues that how we perceive the world shapes how we cognitively engage with it. For example, our individual perception of the color "green" differs from person to person, and this distinct perception forms our unique cognitive framework of "green." Démuth further strengthens this view by asserting, “To study the world means to study perceptions and ideas we created, and the world is mainly the world of perceptions, images or ideas.” This statement underlines his argument that cognition originates from perception, as we construct our understanding of the world based on how we perceive it. Therefore, as Démuth suggests, perception can be seen as the lens through which we view and understand objects and concepts.

Memory

The third aspect of cognition is memory, which follows perception since what we perceive is stored in memory. Lutz and Huitt (2003) emphasize the significance of memory in cognition, stating, “One of the primary areas of cognition studied by researchers is memory…” This highlights the essential role memory plays in mental processes. Memory can be understood as the storage of experiences and knowledge. According to Lutz and Huitt (2003), “memory is the combined total of all mental experiences,” suggesting that it functions as a repository of accumulated perceptions over time. They further argue that memory is a multi-faceted, interconnected system that enables recall and retrieval, essential for cognitive processing. Wang (2009) adds to this by describing memory as a physiological network within the brain responsible for retaining and retrieving information. He notes that memory is not a physical organ but an abstract concept that plays a critical role in cognition, often referred to as a "psychological organ." This view aligns with the idea that memory is the result of brain activity, or as Wang describes it, “networked neural clusters.” Thus, memory functions as a key element of cognition by storing and facilitating the retrieval of information.

Memory is stored for the purpose of being recalled or retrieved when needed, whether for specific conditions or future use. Rouhollah and Armiun (2013) describe memory as “the retention of information for future use,” emphasizing its relevance to daily life. This highlights the integral role memory plays in everyday activities, often occurring unconsciously. To understand how memory functions in our daily lives, it's essential to first examine its three types: sensory memory, working memory (short-term memory), and long-term memory, each serving distinct functions in the cognitive process:

1. Sensory memory is responsible for processing the stimuli that our brain receives. Rouhollah and Armiun (2013) describe sensory memory, also known as the sensory register, as the type of memory that extracts the vast number of stimuli entering our brain. This type of memory lasts for a very brief period, approximately half a second, and cannot be prolonged (Chanquoy et al. in Rouhollah and Armiun, 2013). It serves as a filter for all incoming stimuli, which is why Rouhollah and Armiun refer to it as "extraction." Sensory memory is linked to attention and perception, allowing us to process stimuli effectively. There are two main types of sensory memory: iconic memory, which deals with visual stimuli, and echoic memory, which handles auditory stimuli (Rouhollah and Armiun, 2013).
2. Working memory, also known as short-term memory or primary memory, plays a key role in processing filtered stimuli from sensory memory. According to Rouhollah and Armiun (2013), "It might take up to 20 seconds before the registered or recalled information present at the short-term memory totally fades out. It is in fact because of its function of registering from the sensory memory or recalling from the long-term memory that it has come to be called the working memory." The main point here is that working memory is used for recalling information, while short-term memory is responsible for registering information. Furthermore, short-term memory has a limited duration, which is why we cannot remember every detail or take a long time to recall information. Hartman

and Nelson (2015) note, "In the 'working memory' where we solve problems, space for non-memorized information is minimal, but the ability to recall, hold, and apply previously well-memorized information is essentially unlimited." This highlights that working memory is involved in both recalling stored information and applying it to solve problems, and it is closely connected to reasoning processes.

3. The final type of memory is long-term memory, sometimes referred to as permanent memory. According to Randal in Rouhollah and Armiun (2013), long-term memory stores information about the world, including our knowledge of language and shapes (Semantic Memory), our cumulative life experiences (Episodic Memory), and the automatic procedures involved in skilled behaviors (Procedural Memory). In long-term memory, information becomes permanent, such as the names and shapes of objects. Although long-term memories last for extended periods, they can sometimes be difficult to recall when needed. Hartman and Nelson (2015) explain, "In LTM, information is stored as elements of knowledge (small 'chunks' of memorized facts, equations, or procedures) that are linked to form schema by a process of association..." This illustrates that information stored in long-term memory becomes knowledge, often referred to as permanent knowledge. In summary, long-term memory contains information that can be retrieved by working memory to assist in problem-solving.

Piaget, as cited in Hartman and Nelson (2015), theorized that memory functions through the organization of linked conceptual frameworks, each referred to as a schema. These schemas are formed by two key processes: "assimilation" (the process of incorporating new information into existing memory frameworks) and "accommodation" (modifying existing frameworks to integrate new information). This means that memory works by storing stimuli (or information) in our brain, and under certain conditions, this stored information can be retrieved. When we encounter new stimuli, our brain either assimilates them into existing frameworks or adjusts our mental structures to accommodate the new information.

Reasoning

Reasoning can be defined as the mental activity used to draw conclusions. Holyoak and Morrison (2013) explain that reasoning, rooted in philosophy and logic, focuses on the process of drawing inferences (conclusions) from initial information (premises). From this definition, we can infer that reasoning involves two key components: premises (the information or source) and conclusions (the products of reasoning). As a cognitive process, reasoning is a mental activity. Hardegree (1999) elaborates, stating that reasoning starts with input (premises or data) and leads to output (conclusions), emphasizing that reasoning is a special mental activity called inferring. In other words, to infer is to draw conclusions from premises, data, or facts. This perspective aligns with the idea that premises and conclusions are integral to reasoning. Additionally, Adler (2008) suggests that reasoning is a transition in thought, where certain beliefs or thoughts serve as the foundation for arriving at others. This transition in reasoning must follow a logical sequence, occurring in the mind as we process and connect information.

Reasoning requires input that must be processed to generate an output, which involves both long-term memory (LTM) and working memory (WM). Clark et al. (in Hartman & Nelson, 2013) emphasize that reasoning relies on the interaction between these two cognitive structures: "long-term memory, where information is stored and organized, and working memory, where information is processed." This highlights the importance of processing input to draw valid conclusions. Our knowledge, stored in long-term memory, forms the foundation of our reasoning. Dowden (1993) further supports this idea, stating that logical reasoning is guided by "background knowledge and common sense." Both of these elements reside in long-term memory, making it impossible to engage in reasoning without involving our memory systems.

From these discussions, it is clear that reasoning is essentially an inferencing process. Holyoak and Morrison (2013) distinguish between two types of inference: inductive and deductive. They explain, “In standard logic, an inference is deductive if the truth of the premises guarantees the truth of the conclusion by virtue of the argument form. If the truth of the premises renders the truth of the conclusion more credible, but does not bestow certainty, the inference is called inductive.” The primary difference between these two forms lies in the certainty of the conclusion: deductive reasoning guarantees the conclusion based on the premises, whereas inductive reasoning makes the conclusion

more likely but not certain. Thus, reasoning involves a transition in thought, where beliefs or thoughts serve as the foundation for arriving at other beliefs or conclusions.

Judgment

Judgment can be simply defined as the process of evaluating something, often serving as a precursor to making a choice. According to Biernat and Manis (1994), “judgments are being used to evaluate,” highlighting that the primary function of judgment is evaluation. Furthermore, Einhorn and Hogarth (1981) state that “judgment is generally an aid to choose,” emphasizing that judgment plays a critical role in guiding our decisions. Thus, our choices are shaped by our judgments, which are influenced by our reasoning processes. Judgment is a result of reasoning, which is why it requires careful deliberation and sufficient time to form (Einhorn & Hogarth, 1981). It is not always flawless, as the goal of judgment is not necessarily to find the perfect answer but rather to arrive at a correct one based on our knowledge and experience. Schimelpfenig (2005) explains that “judgment is not choosing the perfect answer. It’s choosing a correct answer within the limits of your experience, knowledge, and abilities,” suggesting that errors in judgment can occur due to the limitations of our knowledge and experience. It is impossible for anyone to know everything. The relationship between judgment and reasoning is further clarified by Bandura (1989), who states, “Even if people know how to reason, they make faulty judgments when they base their reasoning on incomplete or erroneous information, or they fail to consider the full consequences of different choices.” This assertion reinforces the idea that the various aspects of cognition are closely interconnected and influence one another.

Human judgment is influenced by age and experience. For example, a child's judgment about fire differs significantly from that of an adult. Bandura (1989) notes, “With increasing age, human judgment and problem solving depends more heavily on specialized knowledge domains,” emphasizing that as individuals age, their judgments are more shaped by accumulated knowledge and experience. Schimelpfenig (2005) further adds, “Judgment only comes after reflecting on the experience,” underlining the role of reflection in forming judgment. This means that judgment is shaped by both our knowledge and experiences. For instance, we may say, “Coffee is bitter,” only after tasting it. Einhorn and Hogarth (1981) argue that “judgment is often required to predict which actions will lead to specified outcomes,” highlighting that judgment plays a crucial role in anticipating the consequences of our choices. Therefore, a well-informed judgment leads to better decision-making, where the ability to predict outcomes is vital.

Thinking

Thinking, in the context of cognition, refers to the cognitive processing of internal memory representations, a process that can occur both consciously and subconsciously and may not always adhere to the principles of logic (Frensch and Funke, 2002). This definition highlights the crucial role of memory in thinking, as it involves the processing of information stored in our memory. It is important to note that thinking can occur without our deliberate awareness, meaning that even when we feel we are not consciously thinking, our brain is still engaged in cognitive activity. This underscores the idea that thinking can happen both consciously and unconsciously. Monin (1992) provides a complementary definition, describing thinking as a process that unfolds within a complex system (CS) and consists of several stages: (i) receiving information from the environment, (ii) memorizing the information, (iii) the subconscious, and (iv) consciousness. This definition aligns with the one provided by Frensch and Funke, but expands on it by detailing the various cognitive components involved. Specifically, receiving information pertains to attention and perception, memorizing information relates to memory processes, the subconscious is connected to long-term memory, and consciousness encompasses memory, reasoning, and judgment. Given the complexity of thinking, extensive research has been conducted to further understand its multifaceted nature.

Facione (2015), drawing from cognitive science, introduced the concepts of "System 1 Thinking" and "System 2 Thinking." System 1 Thinking is described as a cognitive process where individuals rely heavily on heuristics, situational cues, associated ideas, and vivid memories to make quick and confident judgments. Facione (2015) explains, "In System 1 thinking, one relies heavily on a number of heuristics (cognitive maneuvers), key situational characteristics, readily associated ideas, and vivid memories to arrive quickly and confidently at a judgment… It is particularly helpful in familiar situations

when time is short and immediate action is required." This type of thinking involves memory, reasoning, and judgment working together to form decisions in familiar or urgent situations. On the other hand, System 2 Thinking is a more reflective and deliberate process. Facione (2015) states that "It (System 2 Thinking) is useful for making judgments when you find yourself in unfamiliar situations and have more time to figure things out. It allows us to process abstract concepts, to deliberate, to plan ahead, to consider options carefully, to review and revise our work in the light of relevant guidelines or standards or rules of procedure...It is reasoning based on what we have learned through careful analysis, evaluation, explanation, and self-correction." The key distinction between System 1 and System 2 Thinking lies in the situation at hand—familiar or unfamiliar—and the time available for deliberation. From a cognitive science perspective, some researchers from the connectionism movement propose that thinking is an organic process carried out by the brain's complex network of neurons. Harris (2006) notes that thinking may occur in the brain, which consists of numerous simple processing units connected in an intricate system of fiber tracts, with many units firing simultaneously.

Speaking

Speaking can be viewed as a representation of various cognitive processes, such as memory, reasoning, and judgment. When we think about an object, we rely on our memory, reasoning, and judgment; however, to convey our thoughts to others, we need to speak. Nunan (1991) defines speaking as the act of uttering words or delivering a speech, but this definition should not be taken literally. It is important to recognize that speaking involves multiple cognitive elements beyond mere vocalization. As a cognitive process, speaking cannot occur in isolation; it requires attention and perception, among other cognitive functions, to facilitate the production of meaningful utterances. Thus, speaking is deeply intertwined with various aspects of cognition, reflecting the complexity of the mental processes involved.

DISCUSSION

The Relationship between Language and Cognition

Language acquisition and mastery are closely related to cognitive processes, showing the crucial connection between language and cognition. Cognitive abilities in the brain are critical for learning and mastering language. To go deeper into this connection, experts' perspectives on the relationship between language and cognition are worth considering. Chomsky, as quoted by Harris (2006), argues that language abilities are similar to mental constructs. He claimed that children are born with a "language acquisition device" that contains specific linguistic knowledge, implying that language acquisition is more than just imitation. Chomsky noted that linguistic over-regularizations, in which youngsters produce wrong forms, show that they are actively extracting norms from the language they hear, rather than just reproducing it. The ability to extract rules from exposure demonstrates how important cognition is in language acquisition. Furthermore, Ulbaek (1998) stated that Chomsky saw language as a species-specific module in the human mind, emphasizing that the acquisition of language skills is a result of cognitive growth.

Chomsky's theory has faced significant criticism from various schools of thought, including the culturalists and the continuity theorists. Culturalists reject Chomsky's idea by asserting that humans are unconstrained learning machines, capable of creating culture from which all human cognitive traits, including language, emerge (Ulbaek, 1998). According to this perspective, language development is not solely a result of innate cognitive mechanisms, but rather, it is shaped by the cultural context in which humans are immersed. Similarly, continuity theorists challenge Chomsky's view by emphasizing the role of learning in the development of language. As Ulbaek (1998) explains, some continuity theorists, particularly learning psychologists, adopt a strong anti-Chomskyan stance. They argue that language is undeniably learned, suggesting that cognitive processes involved in language production are heavily influenced by linguistic experiences. This idea aligns with the perspectives of the AI tradition, which also stresses the role of learning in language development, further supporting the notion that cognitive processes, including language, are shaped by experience rather than solely by innate mechanisms.

The psychologists from the AI (artificial intelligence) tradition offer another perspective on the relationship between language and cognition. According to Harris (2006), "language emerged out of the same broad cognitive changes that transform the sensorimotor processing of infants into the formal and logical mind of adults." This view posits that language acquisition is akin to the development of motor skills, such as walking, and progresses over time. As children grow, their ability

to use language becomes more refined, which explains why language development is age-graded. The AI tradition's perspective aligns with the concept of procedural knowledge in second language acquisition (SLA), which involves motor and cognitive skills, and the sequential processing of information, much like playing tennis or producing language (Gass & Selinker, 2008). One prominent figure who agrees with this view is Swiss psychologist Jean Piaget.

An alternative viewpoint comes from the theory of the evolution of language, as explained by Ulbaek (1998). He argues that "language evolved from animal cognition, not from animal communication," asserting that language developed from cognitive systems that were already in place in animals. He challenges the common belief that language emerged from communication systems and instead proposes that cognition predated language, forming the foundation for its emergence. According to Ulbaek, this implies that cognition is a prerequisite for both producing and acquiring language. Furthermore, he suggests that humans invented language because they possessed the cognitive ability to do so, distinguishing them from other species. Ultimately, this perspective emphasizes the central role of cognitive systems in enabling humans to produce and acquire language.

Ulbaek (1998) argues that "having language is a question of cost and benefit, or in Darwinian terms, of losing and gaining fitness," highlighting that while we often focus on the advantages of language, we tend to overlook its potential costs. In the context of natural selection, a species must survive by improving its fitness, and language could be seen as a hindrance since it enables the sharing of information, which may reduce individual fitness. Contrasting this view, Maynard-Smith (1982) posits that "language as a means of giving information away would scarcely seem to be an evolutionary stable strategy," suggesting that language can actually enhance group fitness, which is more beneficial in the face of natural selection than maximizing individual fitness. This concept introduces the idea of Reciprocal Altruism, which Ulbaek (1998) describes as a potential loophole in evolutionary theory. Reciprocal altruism allows humans to share information, thereby increasing group fitness and helping individuals cope with the pressures of natural selection.

The Connectionism perspective offers another view on the relationship between language and cognition. Harris (2006) observed that "the basic system of processing units under these connectionist language models was the same as those used to model visual and motor behavior," suggesting that language production is viewed as a human ability similar to other basic functions such as walking or listening. According to this perspective, cognition, which is the mental process in the brain, plays a crucial role in language production. The connectionist theory proposes that cognition consists of numerous simple processing units (neurons) connected in an intricate network of fiber tracts, with multiple units firing simultaneously (Harris, 2006). This model highlights the interconnected nature of cognitive processes in language development.

The final perspective, Cognitive Linguistics, emphasizes the importance of memory in language acquisition. Harris (2006) cites linguists such as Dwight Bolinger and Charles Fillmore, who argued that "speech utterances, not rules for generating utterances, are what is mentally stored." They suggest that language speakers have memorized a vast array of expressions, colloquialisms, and idiomatic phrases, which share common patterns. In this view, understanding language involves recognizing these patterns and storing them in memory for future use. This perspective acknowledges that language is not only a tool for communication but is also influenced by social factors, which in turn affect cognitive processes. In conclusion, the various perspectives outlined above demonstrate a close relationship between language and cognition. Cognition is seen as a prerequisite for mastering and acquiring language, reinforcing the idea that language is not merely a learned skill, but rather an ability shaped by cognitive processes.

Language and The Aspects of Cognition

Cognition encompasses seven key aspects: Attention, Perception, Memory, Reasoning, Judgment, Thinking, and Speaking. These elements are closely intertwined with language. Effective communication relies heavily on the attention of both the speaker and the listener. In everyday interactions, speakers expect their listeners to focus on what they are saying. Heuttig et al. (2015) emphasized the connection between language, vision, and attention, noting that "language interacts with vision and attention." This suggests that attention plays a fundamental role in language mastery—without attention, language acquisition would not be possible. Kwisthout et al. (2008) further explained that "an important prerequisite of a successful conversation is the participants' ability to engage in joint attention in order to understand each other." For young children, the ability to share attention with an adult regarding an object or action is a significant milestone in language development. Therefore,

attention is essential not only for understanding language but also for acquiring it, making it the first prerequisite in mastering language.

Language and perception are intricately connected, with our perception of language being shaped by our linguistic experiences and knowledge. In communication, perception plays a crucial role in understanding the intended meaning the speaker wishes to convey. According to Boroditsky (2011), “The languages we speak affect our perceptions of the world.” This highlights that our perception is influenced by the language we use and the experiences and knowledge we have acquired. For instance, our perception of a foreign language is often filtered through the lens of our native language. Démuth (2013) further emphasized that perception serves as both the content and the foundation for intellectual cognition, stating that “…perceptions as objects which form the content and diversity of the world, but also the starting point and the source of any sensual or intellectual cognition will therefore be the subject of our thoughts.” This implies that our perception not only shapes our understanding of language but also serves as a critical source in language acquisition.

Similarly, memory plays a pivotal role in language because it enables us to store and access the vast array of words and linguistic structures we use in communication. Rouhollah and Armiun (2013) defined memory as "the retention of information for future use," underscoring its significance in everyday life and communication. From an early age, the language we encounter is stored in our memory, allowing us to use it as a tool for effective communication. Our memory houses patterns, word meanings, and the appropriate ways to use words, all of which are vital for fluent and meaningful language use in daily interactions. Thus, memory not only facilitates the retention of language but also underpins our ability to communicate effectively with others.

Reasoning, as an aspect of cognition, can be understood as the process of inferring conclusions from given input. Hardegree (1999) describes reasoning as starting with input, such as premises or data, and producing an output, which is the conclusion. He further explains that reasoning is a specific mental activity called inferring, or making inferences. To infer, he states, is to draw conclusions from the information provided, whether it is premises, data, or facts. In the context of communication, reasoning plays a crucial role in understanding the meaning conveyed by the speaker. The process involves interpreting the input, which in language performance refers to the utterances made by the speaker, and using this information to draw inferences about the intended message.

Our reasoning processes lead to judgment, which in language is the interpretation of meaning in communication. Judgment reflects the hearer's understanding of the speaker's intention, although it may not always align with what the speaker intends to convey. Differences in knowledge, experiences, or incomplete input during the reasoning process can result in a mismatch between intention and interpretation. As Schimelpfenig (2005) points out, “judgment is not choosing the perfect answer. It’s choosing a correct answer within the limits of your experience, knowledge and abilities.” In spoken communication, judgment is evident in our responses to the speaker, which reflect how we process and understand the information shared.

Producing language goes beyond simply speaking; thinking plays a central role in this process. When we speak, we not only produce words but also carefully select and structure them to convey our intended meaning effectively. For instance, when delivering bad news, we must choose our words thoughtfully to ensure that the message is received with the least emotional impact, allowing the listener to process it calmly. This highlights how thinking in communication involves selecting the right words and forming appropriate sentences to ensure the intended message is accurately conveyed to the hearer. The thought process behind speaking ultimately influences what is spoken, demonstrating how deeply cognition is intertwined with language. This explanation underscores the close relationship between cognition and language. Cognitive aspects such as thinking, memory, attention, and reasoning are integral to our daily communication, whether we are listening or speaking. It is important to recognize that these cognitive processes are shaped by our knowledge and linguistic experiences, which guide us in interpreting and producing language effectively in various contexts.

The Implication on English Language Teaching (ELT)

Understanding the connection between language and cognition, particularly how different cognitive aspects relate to language acquisition, has significant implications for English language teaching. One key implication is that educators should consider the cognitive processes of learners when designing lessons. In the context of Indonesia, where English is a foreign language, students often face limited opportunities to use English outside of the classroom. This restriction creates challenges in mastering the language. By taking cognition and its components into account, teachers can better support students by creating learning environments that offer more opportunities for

practical use of English, aligning with student-centered approaches. Furthermore, English instruction should incorporate real-world activities. This is where task-based learning becomes essential, as it encourages students to engage in tasks that are relevant to real-life situations, helping them become more comfortable with the language and its diverse contexts of use.

The second implication is that the English language teaching process must effectively capture students' attention. Without focused attention, students will struggle to master the material. Therefore, teachers must serve as facilitators who actively engage students and help them maintain their focus on learning. To achieve this, incorporating diverse media, games, and technology into the lesson can be highly effective in sustaining students' attention. In addition to focusing attention, it is crucial for teachers to foster positive perceptions among students regarding English learning. These perceptions should encompass their view of the language itself, the learning materials, and the teacher. If students perceive English learning as enjoyable, their experience will be more engaging and effective. Likewise, positive perceptions of the materials and the teacher can further enhance the overall learning experience.

The third implication is that English language teaching should actively engage memory, reasoning, and thinking processes. Teachers must design lessons that encourage students to revisit and apply prior knowledge. Techniques like tests, active retrieval, spaced retrieval, or vocabulary memorization can help reinforce previous learning. Reasoning, on the other hand, requires that English lessons challenge students to think critically about the language. This goes beyond simple memorization, as students need to reason in order to construct meaning in English. For example, incorporating High Order Thinking Skills (HOTS) questions or activities such as information gaps can stimulate critical thinking. Encouraging students to interpret meaning based on contextual clues is another effective way to develop reasoning skills. Furthermore, thinking skills play a crucial role in the English learning process. Students should be able to synthesize information and draw conclusions. Activities like completing paragraphs or composing texts are valuable strategies that help enhance students' thinking abilities.

Finally, English language teaching should focus on enhancing students' speaking skills. As mentioned earlier, speaking is a key aspect of cognition that can be directly observed. The ability to master, use, and evaluate language is a cognitive process, and this applies to English as well. Therefore, the teaching process should create ample opportunities for students to practice and improve their speaking abilities. By offering a variety of speaking activities and real-life communication scenarios, teachers can help students develop the necessary skills to effectively express themselves in English.

CONCLUSION

Based on the results and discussions, it can be concluded that language and cognition are intricately linked, particularly in relation to the various aspects of cognition. Cognition has two key definitions: (1) the mental processes of knowing, which include aspects such as awareness, perception, reasoning, and judgment; and (2) that which is known, acquired through perception, reasoning, or intuition. This connection is crucial for language acquisition, as the cognitive processes in the brain facilitate learning and mastering a language. Cognition plays an essential role in both acquiring and using language. It is a complex mental process that involves several components: attention, perception, memory, reasoning, judgment, thinking, and speaking. These cognitive aspects support language acquisition, usage, and evaluation. This understanding has several implications for English language teaching: (1) English language instruction should consider learners' cognitive processes; (2) the teaching process must effectively capture students' attention; (3) memory, reasoning, and thinking must be incorporated into teaching strategies; and (4) English teaching should prioritize the development of speaking skills, as this is an observable aspect of cognition.

However, as this study was conducted within a short time frame, the limited number of sources presents a challenge. Therefore, it is recommended that future researchers explore this topic further by incorporating a broader range of sources. Additionally, the scarcity of examples in this study is an issue, so future research should include more practical examples related to language and cognition. Some aspects of cognition were explained in general terms, and providing more specific explanations would enrich the understanding of this relationship.

ACKNOWLEDGMENTS

The researchers would like to express their gratitude for all parties who supported and helped the researchers.

COMPETING INTERESTS

The authors declare that they have no competing interests.

REFERENCES

Adler, J. E. (2008). Introduction: Philosophical Foundation. In J. E. Adler and L. J. Rips (Eds), *Reasoning: Study of Human Inference and Its Foundation* (1-34). Cambridge: Cambridge University Press

Adlini, M. N., Dinda, A. H., Yulinda, S., Chotimah, O., & Merliyana, S. J. (2022). Metode penelitian kualitatif studi pustaka. *Edumaspul: Jurnal Pendidikan*, *6*(1), 974-980. https://doi.org/10.33487/edumaspul.v6i1.3394

Allen, C. (2017). On (not) defining cognition. *Synthese*, *194*(11), 4233-4249. https://doi.org/10.1007/s11229-017-1454-4

Amber, J. S. and Vause, D. J. (2009). *American English: History, Structure and Usage.* Cambridge: Cambridge University Press.

Bandura, A. (1989). Social Cognitive Theory. In R. Vasta (Ed.), *Annals of Child Development*. *Vol. 6. Six Theories of Child Development* (1-60). Greenwich, CT: JAI Press.

Bellugi, U., Bihrle, A., Neville, H., Doherty, S., & Jernigan, T. (2013). Language, cognition, and brain organization in a neurodevelopmental disorder. In M. R. Gunnar & C. A. Nelson (Eds.), *Developmental behavioral neuroscience* (201-232). Psychology Press.

Bergroth, M., & Hansell, K. (2020). Language-aware operational culture: Developing in-service training for early childhood education and care. *Apples-Journal of Applied Language Studies*, *14*(1), 85-102. https://doi.org/10.17011/apples/urn.202006043978

Biernat, M., & Manis, M. (1994). Shifting standards and stereotype-based judgments. *Journal of Personality and Social Psychology, 66*(1), 5–20. https://doi.org/10.1037/0022-3514.66.1.5

Boas, F. (1942). Language and culture. In F. Boas, *Studies in the history of culture: The disciplines of the humanities* (178-184). Banta.

Bodenhausen, G. V and Hugenberg, K. (2003). Attention, Perception, and Social Cognition. In G. V. Bodenhause, C. N. Macrae and K. Hugenberg (Eds). *Handbook of Psychology.* New York: John Wiley and Sons.

Boroditsky, L. (2011). How Language Shapes Thought. *Scientific American*, *304*(2), 62–65. http://www.jstor.org/stable/26002395

Bowen, G. A. (2009). Document analysis as a qualitative research method. *Qualitative research journal*, *9*(2), 27-40. https://doi.org/10.3316/QRJ0902027

Brandimonte, M, Bruno, N and Collina, S. (2006). Cognition. In P. Pawlik, P and G. d'Ydewalle (Eds.) *Psychological Concepts: An International Historical Perspective*. Hove, UK: Psychology Press.

Butterworth, G. (1993). Contexts and cognition in models of cognitive growth. In P. Light & G. Butterworth, *Contexts and cognition: Ways of learning and knowing* (1–13). Hillsdale, NJ: Erlbaum

Chomsky, N. (1999). Language and freedom. *Resonance*, *4*(3), 86-104. https://doi.org/10.1007/BF02838732

Cienki, A. (2015). Spoken language usage events. *Language and Cognition, 7*(4), 499-514. https://doi.org/10.1017/langcog.2015.20

Cipollone, N., Kieser, S. H., and Vasishth. S. (Eds.) (1998) *Language Files seventh edition.* Ohio: Ohio State University Press.

Cong, J., & Liu, H. (2014). Approaching human language with complex networks. *Physics of life reviews*, *11*(4), 598-618. https://doi.org/10.1016/j.plrev.2014.04.004

Crystal, D. (1987) *The Cambridge Encyclopedia of Language.* New York: Cambridge University Press.

Davis, M. H., & Johnsrude, I. S. (2003). Hierarchical processing in spoken language comprehension. *Journal of Neuroscience*, *23*(8), 3423-3431. https://doi.org/10.1523/JNEUROSCI.23-08-03423.2003

De Brigard, F., & Prinz, J. (2010). Attention and consciousness. *Wiley interdisciplinary reviews: Cognitive science*, *1*(1), 51-59. https://doi.org/10.1002/wcs.27

Démuth, A. (2013). *Perception Theories.* Krakow: Association of Slovaks in Poland.

Dowden, B. H. (1993). *Logical Reasoning.* Belmont: Wadsworth Publishing Company.

Duncan, S., & Barrett, L. F. (2007). Affect is a form of cognition: A neurobiological analysis. *Cognition and emotion*, *21*(6), 1184-1211. https://doi.org/10.1080/02699930701437931

Einhorn, H. J., & Hogarth, R. M. (1981). Behavioral decision theory: Processes of judgement and choice. *Annual review of psychology*, *32*(1), 53-88. https://doi.org/10.1146/annurev.ps.32.020181.000413

Facione, P. A. (2015). *Critical Thinking: What It Is and Why It Counts.* California: Measured Reasons and The California Academic Press.

Fennell, D. A. (2006). Evolution in tourism: The theory of reciprocal altruism and tourist–host interactions. *Current Issues in Tourism*, *9*(2), 105-124. https://doi.org/10.1080/13683500608668241

Frensch, P. A. and Funke, J. (2002). Thinking and Problem Solving. In N. Cowan (Ed.), *Encyclopedia of Life Support Systems (EOLSS)*. Eolss Publishers. https://doi.org/10.11588/heidok.00008238

Friederici, A. D. (2011). The brain basis of language processing: from structure to function. *Physiological reviews*, *91*(4), 1357-1392. https://doi.org/10.1152/physrev.00006.2011

Fromkin, V and Rodman, R. (1993). *An Introduction to Language: Fifth Edition.* New York: Holt, Rinehart and Winston, Inc.

Gassm S. M., and Selinker, L. (2008). *Second Language Acquisition Third Edition.* New York: Routledge.

George, M. W. (2008). *The elements of library research: What every student needs to know.* Princeton University Press.

Goswami, U. (2014). *Cognition in children*. Psychology Press.

Greno, J, Collins, A and Resnick, L. (1997). Cognition and Learning. In. D. C. Berliner and R. C. Calfee (Eds.) *Handbook of Educational Psychology* (15 – 46). New York: Simon and Schuster Macmillan

Guenther, R. K. (1997). *Human Cognition.* Prentice Hall College Div.

Hardegree, M. A. (1999). *Symbolic Logic: A First Course Third Edition.* United State: Ingram.

Haris, C. L. (2006). *Language and Cognition.* Retrieved on May 19th, 2023 from https://www.bu.edu/psych/charris/papers/Encyclopedia.pdf

Harris, C. L. (2006). *Language and Cognition.* New York: John Wiley & Sons, Ltd

Hartman, J. R., & Nelson, E. A. (2015). "Do we need to memorize that?" or cognitive science for chemists. *Foundations of Chemistry*, *17*, 263-274. https://doi.org/10.1007/s10698-015-9226-z

Heuttig, F., Srinivasan, N., and Mirsha, R. K. (2015). Introduction to 'Attention and Vision in Language Processing'. In Mishra, R. K., Srinivasan, N., & Huettig, F. (Eds.) *Attention and Vision in Language Processing*. Springer.

Hockett, C. F. (1959). Animal" languages" and human language. *Human Biology*, *31*(1), 32-39. http://www.jstor.org/stable/41449227.

Holyoak, K.J., & Morrison, R.G. (2013). Thinking and reasoning: A reader's guide. In K.J. Holyoak & R.G. Morrison (Eds.), *Oxford Handbook of Thinking and Reasoning.* New York: Oxford University Press.

Jarvis, S., & Pavlenko, A. (2008). *Crosslinguistic influence in language and cognition*. Routledge.

Karimipour, F., & Niroo, A. R. (2015). Alagent-based modelling of urban navigation based on human spatial cognition. *Journal of geomatics science and technology*, *4*(4), 175-192.

Kwisthout, J., Vogt, P., Haselager, P., & Dijkstra, T. (2008). Joint attention and language evolution. *Connection Science*, *20*(2-3), 155-171. https://doi.org/10.1080/09540090802091958

Lenneberg, E. H. (1967). *Biological Foundation of Language.* New York: John Wiley and Sons

Lupien, S. J., Maheu, F., Tu, M., Fiocco, A., & Schramek, T. E. (2007). The effects of stress and stress hormones on human cognition: Implications for the field of brain and cognition. *Brain and cognition*, *65*(3), 209-237. https://doi.org/10.1016/j.bandc.2007.02.007

Lutz, S., & Huitt, W. (2003). Information Processing and Memory: Theory and Applications. Educational Psychology Interactive. Valdosta, GA: Valdosta State University. Retrieved from http://www.edpsycinteractive.org/papers/infoproc.pdf

Majid, A. (2018). Language and cognition. In H. Callan (Ed.), *The International Encyclopedia of Anthropology*. Hoboken: John Wiley & Sons Ltd.

Majid, A., & Levinson, S. C. (2011). The senses in language and culture. *The Senses and Society*, *6*(1), 5-18. https://doi.org/10.2752/174589311X12893982233551

Majid, A., Bowerman, M., Kita, S., Haun, D. B., & Levinson, S. C. (2004). Can language restructure cognition? The case for space. *Trends in cognitive sciences*, *8*(3), 108-114. https://doi.org/10.1016/j.tics.2004.01.003

Mazari, A., & Derraz, N. (2015). Language and culture. *International Journal of Humanities and Cultural Studies*, *2*(2), 350-359.
McWorther, J. (2004). *The Story of Human Language Part I.* The Teaching Company
Monin, Andrei S. "On the definition of the concepts thinking, consciousness, and conscience." *Proceedings of the National Academy of Sciences* 89, no. 13 (1992): 5774-5778. https://doi.org/10.1073/pnas.89.13.5774
Mynard-Smith, J. M. (1982). *Evolution and the Theory of Games.* Cambridge: Cambridge University Press.
Nunan, D. (1991). *Language Teaching Methodology: A Textbook for Teachers.* US, New Jersey: Prentice Hall
Ormrod, J. E. (2011). *Human Learning.* London: Pearson
Perlovsky, L. (2009). Language and cognition. *Neural Networks*, *22*(3), 247-257. https://doi.org/10.1016/j.neunet.2009.03.007
Pinker, S. (2003). Language as an adaptation to the cognitive niche. In M. H. Christiansen & S. Kirby (Eds.), *Studies in the Evolution of Language*. Oxford University Press.
Pinker, S., & Jackendoff, R. (2005). The faculty of language: what's special about it?. *Cognition*, *95*(2), 201-236. https://doi.org/10.1016/j.cognition.2004.08.004
Qiu, W. (2014). Aristotle's definition of language. *International Journal of English Literature and Culture*, *2*(8), 194-202.
Rahmatian, R., & Armiun, N. (2013). Cognitive Strategies of Encoding, Storage, and Retrieval of Lexicon Popular Techniques Applied by Iranian French Language Learners. *International Education Studies*, *6*(8), 47-57. https://files.eric.ed.gov/fulltext/EJ1068723.pdf
Sanden, G. R. (2016). Language: The sharpest tool in the business strategy toolbox. *Corporate Communications: An International Journal*, *21*(3), 274-288. https://doi.org/10.1108/CCIJ-08-2014-0051
Schimelpfenig, T. (2005). *Risk Management for Outdoor Leaders: A Practical Guide for Managing Risk Through Leadership*. National Outdoor Leadership School: Stockpole Books.
Schino, G., & Aureli, F. (2009). Reciprocal altruism in primates: partner choice, cognition, and emotions. *Advances in the Study of Behavior*, *39*, 45-69. https://doi.org/10.1016/S0065-3454(09)39002-6
Snyder, L. G., & Snyder, M. J. (2008). Teaching critical thinking and problem solving skills. *The Journal of Research in Business Education*, *50*(2), 90.
Spolsky, E. (2002). Darwin and Derrida: Cognitive literary theory as a species of post-structuralism. *Poetics Today*, *23*(1), 43-62. https://doi.org/10.1215/03335372-23-1-43
Trivers, R. (2006). Reciprocal altruism: 30 years later. P. M. Kappeler & C. P. Schaik (Eds.), *Cooperation in primates and humans: Mechanisms and evolution* (67-83). Springer
Tylén, K., Weed, E., Wallentin, M., Roepstorff, A., & Frith, C. D. (2010). Language as a tool for interacting minds. *Mind & Language*, *25*(1), 3-29. https://doi.org/10.1111/j.1468-0017.2009.01379.x
Ulbaek, U. (1998). The Origin of Language and Cognition. In J. R. Hurford, M, Studdert-Kennedy, Ch, Knight (eds), *Approaches to the Evolution of Language.* Cambridge: Cambridge University Press.
Wang, H. (2013). Message from the Guest Editor. *Chinese Journal of Applied Linguistics*, *36*(2), 214-215. https://doi.org/10.1515/cjal-2013-0014
Wang, Y. (2009). Formal Description of Cognitive Process of Memorization. Gavrilova, M. L., Tan, C. J. K. (Eds.) *Transactions on Computational Science X,* p 81-98.
Whorf, B. L. (1997). The relation of habitual thought and behavior to language. In N. Coupland & A. Jaworski (Eds.), *Sociolinguistics: A reader* (443-463). Springer
Wijaya, L., & Nasution, N. S. S. (2018, April). Language as Art and Communication Tool. In *AICLL: Annual International Conference on Language and Literature* (Vol. 1, No. 1, pp. 69-74). https://doi.org/10.30743/aicll.v1i1.10