



## Interpreting and its Cognitive Root

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### ARTICLE INFORMATION

Original Research Paper

Received Dec. 2018

Accepted Feb. 2019

#### Keywords:

Cognitive Deficiency,

Mental Load,

Waiting Time,

Working memory

### ABSTRACT

Undoubtedly cognitive process is an important element in almost all modes of translation. Translation has long been identified as a socially situated activity and is referred to as the interaction between the process and context. Translation as subfield of language, therefore, is a cognitive and context bound phenomenon and is regarded as an act and event. Regardless of its various modes, it roots in psycho-social interaction. Accordingly, translation is considered as a social and mental event that manifests in context and is referred to as a biological entity to which cognition is a source of energy. The cognitive power can be realized in space (environment) through translation (interpreting) activity. Translation as an artful communicative task, requires the dimension of mental power and context (space) for realization. The absence and malfunctioning of any of these elements result in the disruption of the flow of communication and increased amount of waiting time and lack of satisfaction. In this work, we intend to trace the relevancy that cognition has with translation and that to pave the way to stimulate for new findings and to make the reader aware of cognitive limitation as an impairing element in translation/interpreting activity. Moreover, we conclude with a discussion of cognitive gaps and suggestions for further research.

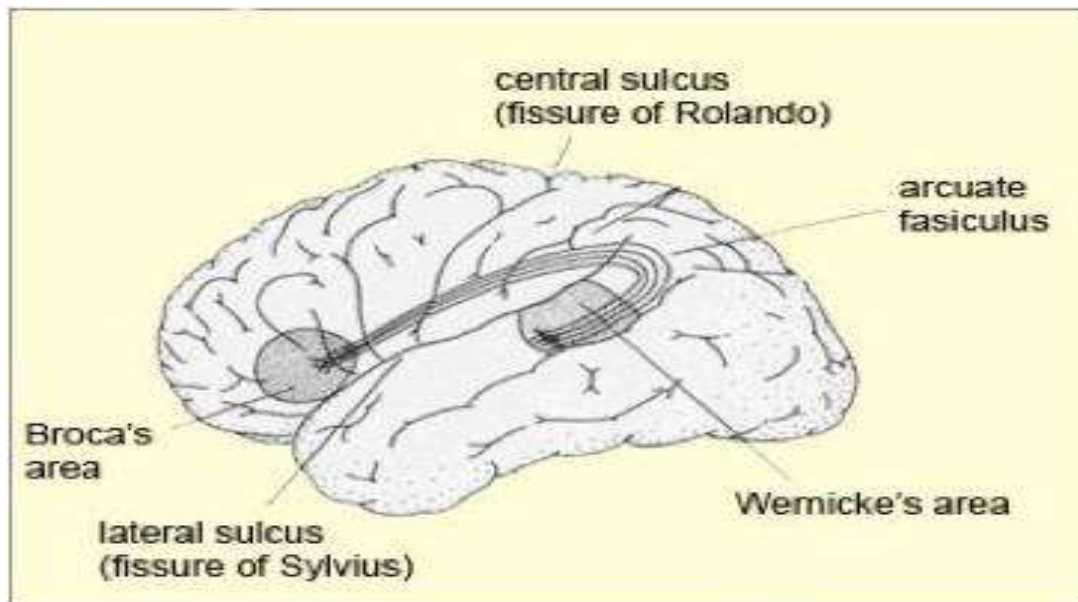
### 1. Introduction

Considering the above points, it is reasonable to say that cognition lies behind language and goes far beyond it and can be referred to as cognitive backstage. As translation is a subpart of language the word 'language' is repeatedly referred to, but the focus of study is on translation and the paramount role of cognition. When we engage in any language activity, it is an artistically creative process and we draw unconsciously on vast cognitive resources and mappings, call up innumerable models and frames all fall into the category of mental mappings which require a top accurate mental processing and computing. The cognitive backstage, an ever-lasting and dynamic process, is referred to as a non-observable element and this non-observable feature of language is an impediment to the researches to get a tangible access to the mental frames and hence the evaluation turns out quite difficult. It is argued that the AI (Artificial Intelligence) in some aspects is a prototype of human's brain but it lacks the creativity and rapid and logical reaction to immediate and unforeseen occurrences that mind well deals with. IA is able just answering to Yes or No questions and follows the conventional rules, while the brain and cognition go far beyond this limit and most researchers agree that even a super-intelligent artificial language is unlikely to exhibit human emotions like love or hate, a major drawback labeled on IA. Accordingly, AI is not able to compute or evaluate the variables available between the two extremes of 'Yes' and 'No', 'Zero/one' which are the focus of attention to Fuzzy Logic of Lotfi A. Zadeh,

whereas the mind do that in an amazing way. To develop the argument, let's start dealing with the relationship that lies between cognition and language. Therefore, it is advisable to study translation (the subpart of language) along with cognition because cognitive factors enable language to emerge and come to existence. Discovering the main source of energy that makes language dynamic, surely illuminates answers to such debating questions as why retrieval of information and images from long term memory to short term memory in some cases is difficult and sometimes impossible (anomic aphasia and circumlocutions)? Language is almost always portrayed as an independent and self-productive entity, while the reality could reflect a different idea. Language same as the other cognitive behaviors, is a mental entity which needs to be developed. Language (translation) is a sociopsychological phenomenon because the mental factors and the neurons mesh with the environmental elements (contextual factors) which are regarded as the prerequisite for language manifestation and maturation. It is worthy of mentioning that mind is powerful enough to encompass all human mental abilities including language and translation. Our argument is focused mainly on language rather than on translation, since language could be the key to translation challenges. Demystifying language and its cognitive aspects, the nature of translation could be well disclosed. So the back-stage cognition and the myriad cognitive mappings that take place in the mind, are absolutely important in controlling language as a mental capacity. Psycholinguistics (the study of the mental processes that a person uses in producing and understanding language and how human learns language), the evidence of brain lateralization, critical age hypothesis as a proof of the biological basis of language, hemiplegics, plasticity, split brains, dichotic listening, cerebral lesions, contralateral brain function, genetic evidence, etc. are plenty of evidences to justify that language and translation are mental and environmental entities. Scrutinizing the special mental mechanism of the brain and the amazing anatomy and physiology of the nervous system and the millions of neurons active in the brain and the Equipotential Theory of the neurons and their multi-functionality feature we can arrive at new conclusions to decode the hidden interrelationship that exists among the elements of cognition, genes, context and translation activity. This question now arises that to what extent does the Modularity Theory truly play out? The lesion in one area of the brain, for instance, left hemisphere known as commanding half for language abilities should impair language acquisition and performance while experiments elsewhere corroborate that for hemiplegics or those who undergo hemispherectomy, the right hemisphere can take over many of the language functions that would normally reside in the left hemisphere, albeit, with some severe loss of language function in adults. If we maintain that mental behaviors are localized in the brain and that the brain is modular or the linguistic abilities are left-hemisphere domain specific, so it is surprising that how the right hemisphere can take over the mental behaviors typically controlled by the left half? This study thus tries to answer this debating question or to pave the way for further study on this challenging area. Certainly the brain is composed of a well-organized data classification filing. This debating question also comes to mind that why a piece of information is missed in the data filing system or does it stay safe forever? If the latter is true, so, where it lies and why its retrieval is either difficult or in some cases impossible and that, is the brain equipped with a morgue (filing)? Clearly, finding answer to such questions and finding the key of the black box of cognition, requires careful studies and extensive work. One assumption could be that the neurons of the brain are multifunctional and equipotential same as the plasticity feature of the two halves. This means that every neuron is able to deal with not only perceptual matters, but is also able to deal with the face recognition perception and can handle visional function and so forth. So, each neuron has the capacity to handle multi functions and thus all the neurons are equipotential to carry out cognitive tasks of any sorts and types, otherwise the brain's commanding system would fail to control the huge and myriad cognitive mappings that take place momentarily in the brain. In other words, a neuron is somehow like water or liquid. Water and liquid in general have the quality to take the shape of any container, so the neuron's function is

somehow resembled to the multi-shape-getting capacity of liquid and hence this means that a neuron has the capacity to deal multiple functions such as face recognition, emotions, perception, vision, etc. The multi functionality feature of neurons makes it possible for the brain's commanding system to control efficiently the huge volume of data processing and heavy and complex computing tasks. So multi-functionality (multidimensional nature) and equipotential feature of neurons are the most important cognitive features. The main problem that causes mental block or makes retrieval difficult, could either be due to the lack of access of the neural system to the already stored and classified data or could be due to the lack of specific data in the data filing system and therefore making the process of getting back information (data) stored on the brain difficult and sometimes impossible, at the worst. Again this question arises that, is a datum erasable or exists in the brain forever and why subjects use circumlocutions or face with anomic aphasia?

Let's come back again to the question 'how the right hemisphere can take over the mental behaviors typically controlled by the left half?' It can be a big surprise to ask why the brain consists of two halves and why the two cerebral hemispheres are connected to each other through the corpus callosum (i.e. callosal commissure or fibrous network)? In order to clarify these debating issues surely we need to have a good understanding of the mechanism of the brain as well as the relevant notions. The prevailing accepted notion about the function of the brain is that the left hemisphere controls the linguistic abilities and the right half controls the non-linguistic elements. If this is so, how hemiplegics can gradually acquire language with the help of the remaining half? And how language savants who are deficient in general intelligence and are intellectually handicapped individuals, despite their disabilities, show remarkable talents in language skills? It is argued that linguistic ability is not derived from some general cognitive ability, but exists independently. The language savants idea supports the modularity notion of language in that if brain were not modular, the savants would be deficient in all cognitive abilities, while we see that in case of savants at least their linguistic ability remains autonomous. It seems logical that the brain is modular, but the ability of children with SLI (Special Language Impairment) is in conflict with the ability of the language savants. Autonomy of language faculty as experienced with SLI children and language savants and its independency of the general cognitive ability and the Equipotentiality notion put forward by Karl Spencer Lashley (the idea that the brain has the ability to use any functioning part of the brain to do what a damaged part of the brain no longer can do; and the coined law of mass action) suggest that there is a possibility that one hemisphere mirrors the other half. In other words, they are reflector of each other and in general the human is favored with two brains with exactly equal capacities and hence in case of cerebral damage to any part of the brain, the brain's function reduces in proportion to the scale of the aphasia. Accordingly, if we accept that following to the left hemisphere lesion, the right one attempts to take over the function of the missing part, thus it can be deduced that a mechanism and anatomy exactly same as the left hemisphere do exist in the right hemisphere and, therefore, the plasticity / flexibility and the contralateral brain function explicitly portray the compatibility and adaptability of the two halves in taking over mutual functions.



The image illustrates Broca and Wernicke areas in the left hemisphere where language abilities reside and it shows that arcuate fasciculus, a nerve of fibers, connects Wernicke's area to Broca's area. French neurosurgeon Paul Broca discovered that the Broca area in the frontal part of the left hemisphere is responsible for language production and hence impairment in this area entails agrammatic speech and problems with syntax. In the 1870s German neurologist Carl Wernicke discovered that Wernicke's lesion or sensory/fluent aphasia in the back part of the left hemisphere results in difficulty in comprehension and those patients who suffer from sensory aphasia face with anomia and use circumlocutions.

Generally speaking, regardless of special cases of hemiplegics and cerebral lesions which impair cognitive function of language abilities, any cognitive deficiency hinders translation activity specially its simultaneous mode that takes place momentarily. If this status occurs, definitely we shall experience increased amount of waiting time (more waiting time vs. less satisfaction), successive pauses, disruption of verbal behavior, loss of confidence, increased number of miscues in both written and oral translation, though the latter requires working on live but the point is that each require different level of accuracy. No translation software can be found to function momentarily parallel with the unobservable cognitive backstage and hence this reveals the artfulness and demanding features of translation and interpreting activity. Therefore, an interpreter or a translator is required to have adequate linguistic and cultural knowledge of both S and T language. Furthermore, interpreter's (translator) expertise and topic familiarity are very contributive, while the absence of these elements entails mental load and cognitive limitations that strongly affect the quality of written or oral translation product. Cognition as an interdisciplinary phenomenon is an unlimited source of energy for every event that takes place in the universe since an event typically encompasses the dimension of space (context) and cognition which are necessary factors behind its realization; likewise, translation (interpreting) is no exception. The notions of localization and equipotentiality imply that all the brain's areas are equally active in overall mental functioning which is logically right and that is to some extent similar to what is already referred to as multidimensionality or multi functionality nature of the brain's neurons, because this feature speeds up the overall mental functioning and the computing and processing mechanism of the brain's nervous system. If we accept that the brain is modular, this idea furthermore seems reasonable that each module like atom generates new module which enjoys the same make-up, commonalities and structural data inherited from its master module to maintain life cycle. So,

this process of modular life cycle maintains a proper data retrieval and storing system.

## 2 Theoretical Framework

This study takes advantage of Fodor's Modularity of Mind and the Equipotential Theory Psychology put forward by U.S. psychologist Karl Spencer Lashley who maintains that all areas of the brain make an equal contribution to overall functioning. In some aspects, the notion put forward by the U.S psychologist is close to the plasticity (i.e. flexibility) idea which argues that after hemispherectomy the remaining hemisphere attempts to take over the functions of the missing one. Let's first deal with the modularity notion of Jerry Fodor which posits that there are functionally specialized regions in the brain that are domain specific for different cognitive processes. In this work our chief focus of study is translation but as translation is a mental activity inevitably we draw unconsciously on cognitive study and its ramifications.



Schematic illustration of the modular brain

Based on the above theory the mind is subdivided into smaller parts called modules that can independently be created and then be used in different systems. The theory supports that a modular organization structure can work more efficiently. It is hence logical that a modular system works more efficiently but this question arises that if the brain is modular for different mental behaviors, and if linguistic abilities are left-hemisphere domain specific, so, how these localized cerebral damaged patients later can retain their language abilities? The aim of this research, therefore, is to find answer to such debating issues as hemispherectomy versus retention of language abilities.

## 3 Methodology

This work combines a qualitative explanatory case study design and is theory grounded with the aim of theory building through comparative analysis. This study concludes with guidelines to moderate the mental load



and cognitive impairment. This might also be worthy of mentioning that the use of Logic and Probability Theory in this research has many benefits including combining logic with probability to make new deductions. The very idea of combining logic and probability might look strange at first sight as logic is concerned with absolutely certain truths and inferences, while probability theory deals with uncertainties. The combining of logic and probability theories and taking advantage of observation hence can greatly lead to new findings. It should therefore come as no surprise that they have been applied in all fields that study reasoning mechanisms such as philosophy, artificial intelligence (AI), cognitive science and mathematics. Unobservable feature of cognition makes it impossible to give a thorough description of the cognitive system. Instead, arguments backed by logical reasoning (logic combined with probability and observation) help to fill the gaps in our knowledge of the non-observable cognitive backstage.

#### **4 Research Question**

Does cognitive limitation impair the flow of communication and affect translation output?

#### **5 Literature Review**

As already stated, translation/interpreting is an activity which embraces mental and contextual elements. Therefore, same as other mental events or occurrences in the universe, translation requires a cognitive power accompanied with context for manifestation, but the two factors operate in tandem. Translation similar to simultaneous interpreting mode is cognitive and context bound and hence the role of cognition in all modes of translation is of paramount importance. Therefore, cognitive limitation resulting from cerebral lesions, anomic aphasia (a type of aphasia characterized by problems recalling words or names and using circumlocutions) and so forth could have a direct impact on the quality of output of a translational activity. Clearly the commonalities between oral and written translation make our study more meaningful. Accordingly, the similarity that exists among all modes of translation activity is the cognitive and contextual features that enable a phenomenon like translation or interpreting task to take the form of an event as translation in general is a mental behavior which is closely involved in cognitive system and hence the cognitive malfunctioning results in semantic deviations, miscues, and disruption of communication either oral or written. In fact, the more cognitive deficiency entails a less quality output.

Clearly the accuracy of interpretation or restating of the original message in the receptor counter is directly related to the interpreter/translator's degree of comprehension. Now this question comes to mind that 'under what conditions an accurate comprehension takes place?' It is possible to posit a number of conditions (e.g. "familiarity with the subject matter, (Dennis Cokely, 2014)" and interpreter/translator's adequate linguistic and cultural knowledge of both S and T language etc. Dennis Cokely implicitly notifies that the existence of shared and encyclopedic knowledge are contributive to fully comprehend the pragmatic and to decode correctly the original message. It should be reminded that our focus of study in this work is on interpreting and its cognitive roots, while nearly all modes of translation are referred to because cognitive roots and mental limitations as common factors, impair translation process either oral or written. The keywords 'immediacy' and 'here and now' as distinguishing features of simultaneous interpreting are attached to simultaneous interpreting mode by Franz Pochhaker who holds that interpreting is a task which is performed across linguistic and cultural differences that exist between S and T language: "Within the conceptual structure of translation, interpreting can be distinguished from other types of translational activities most succinctly by its special feature of immediacy: in principle, interpreting is performed 'here and now' for the benefit of people who want to be engaged in communication across the barriers of language and culture (Franz Pochhaker, 2003). The barriers of language

and culture which this scholar refers to could be the lack of cultural and linguistic counterpart and commonalities between S and T language. The phrase 'here and now' suggests the shortage of time and stressful condition under which simultaneous interpreting work is carried out. Minhua Liu, Diane L. Schallert and Patrick J. Carroll in their work titled *Working memory and expertise in simultaneous interpreting* (2004) applying the sentence, "moment-by-moment operations in the process of simultaneous interpreting involve expressing in the target language the meaning of the original message", develop the concept of concurrent speaking and listening which clearly points out that simultaneous interpreting could be a stressful experience. David Morley supports a mental quality for any language activity and hence in this aspect enjoys a common point with Gile and Jean Piaget who maintain that language is environmental and cognitive bound, thus indirectly notifying that language is a biological phenomenon: "When we engage in any language activity, it is an artistically creative act of community and we draw unconsciously on vast cognitive resources and mappings (mental models) call up innumerable models and frames, set up multiple connections, coordinate large arrays of information, and engage in creative mappings, transfers and elaborations (David Morley, 2012)". Attila IMRE in the paper '*Communication Through Translation*' posits that translation is as a bridge between participants of a social context. Furthermore, asserts that there is a strong relationship between communication, language and translation. This idea reveals that language and translation are biological entities that realize in context.

Swiss developmental psychologist Jean Piaget (1896-1980) also asserts that: "the cognitive development as a progressive reorganization of mental processes resulting from biological maturation and environmental experience". This scholar believes that children construct an understanding of the world around them, experience discrepancies between what they already know and what they discover in their environment, then adjust their ideas accordingly". Arina V. Annenkova (2012) also in the paper '*Translation as a Means of Teaching Intercultural Communication*' affirms that translation process involves human cognitive sphere and intercultural issues. John Benjamins in his book *Describing Cognitive Processes in Translation: Acts and Events* addresses translation as an act and event and has its main focus on the cognitive and mental processes of interpreting (translation) as well as including the social situation (context) in the exploration of interpreting or translating process and at the same time the paper by Andrew Brook / Pete Mandik titled *The Philosophy and Neuroscience Movement* (2007) embodies elaborations on such concepts as linguistic deficits of aphasic patients, localization, cognition and the brain as quite relevant terms to language and interpreting activity. Gile's Effort Models for Interpreting (March 25,2014) typically exemplifies the cognitive property of interpreting and the necessity of memory effort in any translational activity: "The key concepts of the Effort Models are the Processing Capacity and 'the fact that some mental operations in interpreting require' a significant amount of it (Gile, 1992: 191). Since each interpreting phase implies an effort, the interpreter should therefore be able to find a balance among them in terms of energy.

Kade in the following saying along with Pochhaker postulates stressful condition and the shortage of time in simultaneous interpreting: "Interpretation is defined as a form of translation in which the source-language text is presented only once and thus cannot be reviewed or replayed, and the target-language text is produced under time pressure, with little chance for correction and revision (Kade, 1968)". This saying by Jean Piaget also illustrates the importance of environment in maturation of cognitive data: "It is greatly worthy of mentioning that the cognitive development is a progressive reorganization of mental processes which result from biological maturation and environmental experience (Jean Piaget, 1896-1980); the notion also argues that children construct an understanding of the world around them, experience discrepancies between what they already know and what they discover in their environment and then adjust their ideas accordingly". This also deserves

consideration that regardless of some minor differences John Benjamins, Jean Piaget along with Chernov / Gerer, David Morley, Gile, Andrew Brook / Pete Mandik, Warren Burggren supports cognitive involvement in language and translation (interpreting) activities. Nearly all these scholars admit that language as well as any translational activity is the result of the involvement of cognitive and environmental factors. Warren Burggren, meanwhile, in the the following notion asserts epigenetic involvement and its contributing role in language evolvement. It is notable as well that Jean Piaget and Noam Chomsky hold a mentalistic view on language. Warren Burggren's notion also deserves consideration: "Epigenetic inheritance likely contributes to evolution both directly and indirectly (Warren Burggren, 2016), hence there is a necessity to illuminate the terrestrial environmental role in language evolvement". Warren Burggren implicitly takes into account the biological aspect of language and that language evolvement is influenced by the surrounding environment. Nearly all the notions put forward by these scholars, illuminate the cognitive and environmental characteristic of language in general and interpreting activity in particular. Simultaneous interpreting, therefore, is referred to as truly a work of art that realizes in stressful condition by an interpreter who has a high sense of imagination and with adequate linguistic and cultural knowledge of S and T language as well as being well skilled in improvisation and extemporization. In view of these facts, therefore, language is strongly tied with cognition, context (space), and neural underpinnings. In this work the focus of argument is being shifted from 'interpreting activity' to 'language and its features' largely due to the fact that translation/interpreting is regarded as a subpart of language and hence demystification of language, illuminates the non-observable cognitive realm and the mechanism relevant to translation activity.

## 6 Conclusion

In view of all the above facts it can be deduced that lag time, pauses, mental load on the mind of interpreter, and semantic deviations in translation specially of its simultaneous mode, have a direct relationship with cognitive impairment, linguistic deficiency, and environmental impacts. Generally speaking translation is an act and event with having its main source of energy in the cognitive and mental processes. If the retrieval of the already stored information takes a long time or in some cases becomes impossible, could be due to such problems as either the neurons do not find a datum equal to the one which exists outside of the brain (mirrored data mechanism) or the already stored datum is being damaged as the result of cerebral lesions. The lack of shared knowledge between the brain's data system and the contextual data causes successive pauses, interrupted flow of communication, delay in the reproduction of a new output in the receptor language and ultimately we should expect to experience cognitive load on the mind of interpreter and feeling of anxiety. One way to eliminate or moderate the increased amount of waiting time (lag time), successive pauses and cognitive load is to recommend interpreters to obtain encyclopedic knowledge about the topic because inadequate familiarity with topic and subject of discussion definitely results in semantic deviation and inaccurate rendering. Interpreters should create a temporal synchrony with the source message and this mostly happens once encyclopedic and shared- knowledge are available. Interpreter's performance, however, is compared with the amount of waiting time and the number of miscues and errors. Accordingly, there is a direct relationship between the amount of lag time and interpreter's number of errors. Short-term memory limitation also is a barrier to interpreter's grasp of sufficient portion of the original message. The more an interpreter obtains the encyclopedic knowledge, the less the pauses, miscues, and the cognitive load will be and more swiftly the retrieval of information from the long term memory to the working memory will be. Therefore, topic familiarity, interpreter/translator's background information, linguistic and cultural knowledge and content relevancy play an important role to achieve a perfect apprehension of source language message and to offer a quality interpreting product; conversely, the absence of



any of these factors could lead to mental load and cognitive deficiency.

### **Acknowledgement**

Building an academic discipline requires the committed efforts of many researchers, and it is only on the strength of the collective achievements of scholars past and present that this work has come to exist. I actually owe a great debt of gratitude to the entire community of scholars who have contributed to this field. My sincere thanks also go to Dr. Abdollah Karimzadeh and Dr. Ahmad Basir Vafai whose effective cooperation has been valuable. I am also extremely grateful to the esteemed reviewers for their useful guidelines and the invaluable time they spent on reviewing the current work.

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### **Appendix**

#### **Transcription Notations**

AI	Artificial Inteligence
S	Source
SL	Source Language
T	Target
TL	Target Language