Children with ‘plastic’ brains: A critical Overview of Halpern’s approach of How Children Learn Their Mother Tongue

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Sveučilište u Zadru

Odjel za lingvistiku

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Kritički osvrt na Halpernovu hipotezu o usvajanju prvog jezika

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Zadar, 03.10.2023.

Sažetak rada

Ovaj rad daje kritički osvrt na Halpernovu hipotezu o usvajanju prvog jezika. Ispitana je valjanost Halpernove hipoteze te je napravljena usporedba sa Chomskyjevom teorijom Univerzalne gramatike. Valjanost Halpernove hipoteze testirana je korištenjem niza kriterija koji se nalaze u postojećoj literaturi. Usporedba prvo uključuje razradu argumenata za i protiv Halpernove hipoteze i univerzalne gramatike, kao i izvođenje zaključaka na temelju dokaza pronađenih u postojećoj literaturi. Metodologija uključuje Pinkerovih šest kriterija za dobru teoriju te neurolingvističke, lingvističke i empirijske dokaze prikupljene iz postojeće literature. Halpernova hipoteza (2015) i Univerzalna gramatika (1995) prvo su zasebno detaljno razrađene, a kasnije se uspoređuju međusobno u raspravi. Nakon rasprave i detaljnog pojašnjenja Halpernove hipoteze i Univerzalne gramatike, ovaj rad ukazuje da se Halpernova hipoteza ne može smatrati teorijom jer nedostaju važni neurolingvistički, lingvistički i empirijski dokazi.

Ključne riječi: usvajanje prvog jezika, učiti, usvajati, teorija, ‘plastični’ mozak

Abstract

This study gives a critical overview on Halpern’s approach on how children acquire their mother tongue. The validity of Halpern’s approach has been tested and a comparison with Universal Grammar by Chomsky has been made. The validity of Halpern’s approach has been tested out using a set of criteria found in the existing literature. The comparison includes firstly elaborating arguments for and against both Halpern’s approach and Universal Grammar, as well as drawing conclusions based on the evidence found in the existing literature. The methodology that was incorporated in this study included Pinker’s six criteria for a good theory, and neurolinguistic, linguistic and empirical evidence gathered from existing literature. Both Halpern’s approach (2015) and UG model (1995) had firstly been elaborated separately in detail and later on compared to one another in the discussion. After discussing and presenting both Halpern’s approach and UG model, this study indicates that Halpern’s approach cannot be seen as a theory as it lacks important neurolinguistic, linguistic and empirical evidence.

Keywords: first language acquisition, learn, acquire, theory, ‘plastic’ brain

Content

1. Introduction

The human language has to be one of the most fascinating mysteries known to humankind. How does one learn a language? What even is a language? Is language something we are born with? Or do we gain knowledge about language through/via our environment? How do children manage to learn a language so fast? Why do children even acquire language? All of these questions have been a part of numerous linguistic discussions about language acquisition, yet the area is still left to be explored further. As both terms are dependent on one another, it was crucial to firstly define the term language, and then continue onto the discussion of how we even acquire one. Many linguists such as Chomsky (1995), Halpern (2015), Lin (2017), and many more have attempted to precisely define how children acquire language, but due to the complexity of the field itself, no linguist can claim to fully understand and know how children really acquire language. But, on the one hand we are for certain that children do not simply learn a language by repeating and memorizing a sentence, but rather they seem to acquire some sort of a system of grammatical rules. It is a known fact that no one teaches children grammatical rules or explains it to them, therefore it is even more interesting to go in depth into how children understand and learn a language without even having anyone explain it to them. A lot of proposals regarding this matter have been made throughout the years, but only Chomsky's idea of Universal Grammar has gained such attention, due to much evidence supporting not only his idea of the UG model but his theory in general. His idea was a solid breakthrough in the field of language acquisition, and nowadays, linguists like Christensen (2019) still refer to his theory as "the best theory" because of the richness of evidence found in supporting this theory. On the one hand, Chomsky's idea of how children acquire language may seem vague to some linguists, but for the most part his theory is still the leading theory in this field. Linguists like Halpern have been known to criticize Chomsky's theory of Universal Grammar, but have not been as successful as Chomsky himself, in providing the much-needed evidence to support their ideas. Therefore, being drawn by both Chomsky's theory and Halpern's approach, and their so called "bickering" over the idea of how children acquire language, I find it interesting to explore the merits and limits of Chomsky's and Halpern's approach and to compare and evaluate their arguments.

In this study, the process of acquiring a language on the basis of the existing literature on the topic will be discussed. Moreover, the focus will be placed on the term theory itself, that is, what makes a good theory, and what the criteria for a successful theory according to Pinker are. Furthermore, Chomsky's Universal Grammar theory will be discussed, as well as arguments for and against this theory that were proposed by other linguists. After elaborating both arguments for and against UG, the focus will shift towards Halpern's approach and his claim that children have a 'plastic' brain. Lastly, after presenting arguments for both the UG theory and Halpern's approach, a comparison of both of these theories will be made, and using Pinker's set of criteria, Halpern's approach will be tested.

Firstly, let us elaborate how the field of first language acquisition became an important field in linguistic research. When referring to language studies, one must not only take into consideration language itself as a term, but also the behavior that involves speech and related components. The data used in language studies cannot just be analyzed simply, rather one must take into consideration that every language and every grammar are complex, making the field

rather not so easy to research. Therefore it can be stated, as according to Blume and Lust (1941); *"The science of linguistics must combine with behavioral science to pursue a definition of language data and language data measurement to apply the scientific method. Only in this manner can systematic evidence be collected to provide insight into the study of language acquisition. … The study of language is now recognized as a cognitive science, integrating the interdisciplinary study of linguistics, philosophy, psychology, and computer science."* (Blume and Lust, 1941).

In short, the study of language has evolved and became far more complex, and now more factors and components need to be taken into consideration in order to correctly research the field. The study of language goes back to Darwin, who claimed that language ability is "an instinctive tendency to acquire an art", and that "Language is an art, like brewing or baking" (Darwin, 1859/1874, p. 121). Of course, today, the modern study of language is far more advanced than this, but it is crucial to mention some of the first ideas about language that were proposed.

The study, like Chomsky's Universal Grammar theory, has been characterized as one of the "best theories" in the field of first language acquisition. Chomsky's proposal was that UG was a part of the biologically endowed human language faculty. That is, children are provided with the general structure that underlines all human language grammars, meaning the child itself acquires the language on the basis of these structures. Chomsky (1988) will go further in depth with this theory and present it later on in greater detail in the following sections, but for now, it was important to mention one of the leading theories in this field, a theory that is also one of my main focuses in this research. The other focus is going to be Halpern's approach that is contrary to Chomsky's belief. In short, Halpern claims that "The third possibility is that the mind of the infant—or better, his brain—is so unformed at birth, so plastic, so malleable, so much more impressionable than even the traditional philosophic *tabula rasa*, that it does not *acquire*, but is *formed by*, the language it hears" (Halpern, 2015). Although Halpern's approach may seem interesting, it has been criticized to have lacked evidence, such evidence found for Chomsky's theory. Therefore, I have found both of these theories to be intriguing and will attempt to not only present both theories but also compare them to one another based on different criteria that will be presented later on in this research.

1.1. What is a theory?

Before we even begin to talk about Chomsky's and Halpern's theories, it is important to define the term theory itself. Firstly, according to Littlejohn (et al., 2016) a theory is "a unified, or coherent, body of propositions that provide a philosophically consistent picture of a subject." (Littlejohn, 2016, p.7.) Or in other words, a theory is the attempt to provide an adequate description of the phenomenon or process or parts of it. Although this definition is rather short, it does imply that a theory must be logically non-contradictory. On the other hand, VanPatten and Williams (2015), in their book concerning second language acquisition, refer to theory as "a set of statements about natural phenomena that explains why these phenomena occur the way they do". "A theory simply must account for or explain the observed phenomena" (VanPatten & Williams, 2015, p. 1). Additionally, it does not only account for or explain the

observed phenomena but also it has to make predictions, - i.e., predictions concerning how the process or phenomenon might develop or change in the future. Moreover, a good theory will also "tend to unify a series of generalizations about the world or unify a series of observations about the world" (VanPatten & Williams, 2015, p. 4). In short, based on both of these definitions we can conclude that a theory describes a process or phenomenon, explains why it occurs and makes predictions about its potential outcomes or development. VanPatten and Williams also mention some key points or requirements regarding a theory, which I find of importance to mention, that are the following:

"Theories ought to explain observable phenomena.

Theories ought to unify explanations of various phenomena where possible.

Theories are used to generate hypotheses that can be tested empirically.

Theories may be explanations of a thing (such as language) or explanations of how something comes to be (such as the acquisition of language).

Theories have constructs, which in turn are defined in the theory." (VanPatten & Williams, 2015, p. 7)

These points will be also taken as part of my criteria when discussing whether Halpern's approach can be seen as a theory. (cf. section 4.4.)

It is also crucial to mention that theories themselves have dimensions. The following four dimensions that I will present, were introduced by Littlejohn, A. Foss and G. Oetzel (2016) in their book regarding human communication theories. The first dimension includes philosophical assumptions, that is, basic beliefs that underlie the theory. It can be seen as the first step towards understanding a theory, and it includes assumptions about epistemology, assumptions about ontology, and assumptions about axiology. The first assumption is about epistemology or the study of knowledge. It involves questions about knowledge before experience, the certainty of knowledge, how does knowledge arise, constructivism, is knowledge conceived partly or fully, and to what extent can knowledge be explicit (Littlejohn et al., 2016, p. 8). Simply explained, we must find explanations that justify our knowledge, define how we possess or acquired this knowledge, is this knowledge even possible or gainable or e.g. based on objective evidence/logical arguments, why do we even possess this knowledge, and how can it be structured.

Next, we are moving onto ontology that deals with the nature of being and is also closely related to epistemology. Here the focus is on questions about existence. That is, it can focus on the nature of human existence, or on the nature of human social interaction. It is important to mention, that here we are not focusing on theories of communication nor social sciences, but rather language studies and therefore we shall not go into further detail about this type. The last type involves axiology that studies values, that is "the values that guide research and the implications of those values for the outcome of the research process" (Littlejohn et al., 2016, p. 11). Here, the main questions refer to whether a theory can be value free, do scholars affect the process being studied, if scholarship should be designed to achieve change, or is its function simply to generate knowledge. The second dimension of theory involves concepts. These concepts are crucial because they state how variables relate to one another, that is, we cannot form a theory without connecting categories for something to one another, we simply must

explain how concepts are connected. The following dimension involves explanations. Simply put, with explanations we answer the question: Why? Without answering this question, a theory is simply not plausible, it is not valid, nor will it be seen as a theory. And lastly, the fourth dimension relates to principles. A principle is "a proposition, precept, or guideline that enables someone to interpret and evaluate an event and decide how to act in the situation" (Littlejohn et al., 2016, p. 14). Having taken into consideration all of these four dimensions, it can be noted that for every theory or field of research, each individual can start from different philosophical assumptions and use different concepts and explanations, in order to create their theory. Therefore, I will use the criteria mentioned earlier, as well as these four assumptions, as a guide to test out whether Halpern's approach can be considered to be a good and valid approach to or theory of L1 acquisition.

1.2. Aims and methodology of the study

The aim of this study is to give a critical overview on Halpern's approach on how children acquire their mother tongue. The focus is on discussing the validity of Halpern's approach, as well as comparing it to Universal Grammar by Chomsky. The methodology includes different sets of criteria found in the existing literature. The first set of criteria will be Pinker's set of criteria for a good theory, that Halpern himself used to test out his own approach. Another set of criteria involves neurolinguistic, linguistic and empirical evidence gathered from existing literature. Both Halpern's approach and UG model (1995) will be critically discussed first separately, and then compared to one another. Finally, I will provide a conclusion and state whether Halpern's approach can or cannot be seen as a theory based on the set of criteria and on the existing literature.

2. Theoretical background

2.1. Criteria for a good theory in language acquisition

More on the topic of the term theory, it is important to define how one can form a good theory in language acquisition. According to Mitchell and Myles (2004: 6-9), a good theory is not just a description, but an explanation of a phenomenon. Moreover, they provide the following key criteria concerning a theory and what it should consist of: "Clear and explicit statements of the ground the theory is supposed to cover, and the claims it is making. Systematic procedures for confirming or disconfirming the theory, through data gathering and interpretation: a good theory must be testable or falsifiable in some way. Not only descriptions of second-language phenomena, but attempts to explain why they are so, and to propose mechanisms for change. Last but not least, engagement with other theories in the field, and serious attempts to account for at least some of the phenomena that are 'common ground' in ongoing public discussion" (Mitchell & Myles, 2004). In an attempt to sum up the aforementioned sets of criteria concerning a good theory put forward by the different authors, we can notice a pattern that indicates that a theory simply must provide an adequate description and explanation of the phenomenon or process in question, include related concepts and must be testable or falsifiable.

Therefore, Halpern's approach will be tested on the basis of these criteria in order to see whether it can be classified as a theory. However, even if Halpern's approach fulfills this set of criteria of what makes a good theory in language acquisition, it does not necessarily mean that his approach can also be seen as 'the best theory', a question that will be discussed in more detail in the following sections.

Now we come to the question of what makes a theory successful. The following six criteria that I will present were introduced by Pinker (1980), and Halpern himself (2015) used these sets of criteria to provide evidence that his theory is successful. The first criterion refers to *the Learnability Condition,* that "must posit mechanisms powerful enough to acquire a natural language" (Halpern, 2015). Here, when referring to child language acquisition, taking into consideration the fact that language rules are intricate and abstract, children still succeed in learning these rules successfully. Next, we have *the Equipotentiality Condition* that "must not posit mechanisms specific to one particular language" (Halpern, 2015). In explanation, "the theory should not account for the child's success by positing mechanisms narrowly adapted to the acquisition of a particular language." (Pinker, 1980). The following criteria are *the Time condition* that "allows a child to learn the basic language within the normal time (three years)", and t*he Input Condition* that "does not require quantity or quality of information that is not available to the child" (Halpern, 2015). Lastly, the following two criteria are *the Developmental Condition* that "must agree with what is known of language acquisition by children", and *the Cognitive Condition* that "must not be wildly inconsistent with the known cognitive faculties of children" (Halpern, 2015). After presenting all six criteria, they will be used later on in the analysis to test out whether Halpern's approach can be seen as a successful and valid theory.

2.2. Language acquisition among children: What, how and when?

It is a known fact that children do not acquire a language simply by repeating what they have heard or by memorizing sentences, but rather they acquire the language by implicitly or unconsciously learning a system of grammatical rules. Now, the question lies in how they acquire this system and why they even acquire it. It must be noted that the question of how children acquire language has not yet been fully answered by scientific research and therefore we can only base our knowledge on well-known suggestions and theories such as Universal Grammar by Chomsky and other theories. But we can identify what children learn, and in what stages they acquire certain parts of grammar and language.

First, we can clarify what is learned and what is not learned. According to Fromkin, Rodman and Hyams (2011), children may possess certain knowledge, such as the hierarchical organization of the sentence, without it being provided to them from the received input. For example, they will form sentences such as "*The boy is sleeping. - Is the boy sleeping?"* (Fromkin et al., 2011), as a result of correctly inverting the main auxiliary, rather than forming a sentence such as "*Is the boy who__sleeping was dreaming?*" (Fromkin et al., 2011). In this example, the child moved the auxiliary of the main clause and formed a correct sentence, without being explicitly instructed about the grammatical rule and actual justification of why the sentence should be formed in such a way. This provides evidence that children possess

knowledge and certain rules about something they have not been able to conclude with from the linguistic input they have been exposed to.

Moreover, the input that children receive can simply be seen as a sequence of sounds, and not a set of phrase structure trees, yet children manage to formulate rules according to this structure. This may be interpreted as a proof of the innateness hypothesis, which states that children do not learn structure dependency or some other universal principles of sentence formation, but rather claims that such aspects of grammar are part of the innate blueprint for language. This proves that children acquire some aspects of language and learn them, but they may already possess some other aspects that are not learned but rather innate. Furthermore, children acquire the language that they are exposed to, that they hear, and not just any language. They learn particular sounds and words of the language they are exposed to, as well as the grammatical rules for this particular language (Fromkin, Rodman and Hyams, 2014).

Researchers have identified the stages in language acquisition and what children actually acquire on each stage. An interesting fact regarding earlier studies about language acquisition is that it first came from diaries kept by parents (Fromkin, Rodman and Hyams, 2014, p. 398), whereas nowadays many studies are based on tape recordings, videotapes and controlled experiments. Nowadays, linguists can simply record a child's language development and directly study the child's production and comprehension. From these studies, linguists have determined different stages of when children acquire language and which particular aspect they acquire.

The first stage refers to when a child is still an infant. Studies of first language acquisition have shown that "infants respond to visual depth and distance distinctions, differences between rigid and flexible physical properties of objects, and to human faces" (Fromkin et al., 2011). Moreover, some studies show that if the infant is familiar with certain words, stress patterns or sounds, it will react by turning their heads towards it. A great example taken from Fromkin, Rodman and Hyams (2011, p. 399), is when babies slowly decrease their rate of sucking while hearing a human voice over a speaker saying [pa] [pa] [pa]. And if this sound changes even slightly, say go from [pa] to [ba], the sucking rate of the infant will increase dramatically, which proves that differentiating between the allophones of a phoneme comes to a child naturally, whereas adults find it difficult. Even more interesting, studies have shown that "babies do not correspond to phonemic contrasts in any human language, such as sound spoken more or less loudly" (Fromkin et al, 2011). But rather, just like adults, they ignore the non linguistic aspects of a speech signal. Moreover, because infants are able to understand sounds that are phonemic in some language it also makes it possible for them to learn any language that they are exposed to.

During their first year of life, they normally cover sounds of the language that they are exposed to. From six months the infant loses the ability to discriminate between sounds that are not phonemic in his own language due to the impact from the linguistic environment. In short, first they understand the sounds of human language and later on they learn the sound of the language of their parents (Fromkin et al., 2014, p. 399). After the first stage of acquiring sound, the infant at around six months starts to babble, known as the 'babble stage'.

In this stage, sounds that the infant produces may not only be from the language or the languages (in the case of bilingual L1 acquisition) of the household/family, but may include other sounds. In this stage babbles consist mostly of repeated consonant vowel sequences such

as *mama*, *dada*, and *gaga*. From four to seven months, the infant produces a restricted set of phonetic forms. The sound by the end of the first year starts to sound like actual words, most of the time without any specific meaning attached to them. During the first year, the infant's perception and production merely depends on the language that they have been exposed to.

After the babbling stage, after age one, the child uses the learnt string of sounds to mean the same thing and ends up producing its first words. Here the words represent a fixed sound-meaning pairing, that is, children begin to give meaning to their words and sounds and begin to connect them. This stage can also include producing utterances that consist of only one word. This is called holophrastic or 'whole phrase' stage, where this utterance that consists of only one word conveys the meaning of the entire sentence. An example can be taken from children producing words like *down* or *up,* or *mommy* or *daddy,* using these words to convey whole sentences, such as to be put down or to be held, or to want one of their parents to come. This indicates that children may possess a more complex mental representation of their language, but they cannot yet fully express it. That is why they use only one word and not a whole sentence.

Another interesting process is *prosodic bootstrapping*, "when infants use the stress pattern of the language as a start to word learning" (Fromkin et al., 2014). In explanation, the infant needs to figure out which stress pattern they are dealing with, before they can use the information to extract the words of his language from fluent speech. In other words, "the infant would have to know the language to learn the language" (Fromkin et al., 2014, p. 403).

When we refer to acquiring phonology, a child firstly acquires a small set of sounds that are common to all languages and not just their parents' language. Later on, the child acquires specific sounds related to only his language. Although the child's first words are generally monosyllabic with a consonant-vowel form, this later on develops into actual longer words. "The order of acquiring certain classes of sounds begins normally with vowels and continues by manner of articulation of consonants; nasals, glides, stops, liquids, fricatives, and lastly, affricatives" (Fromkin et al, 2014). Therefore, it comes to no surprise that the child's first words are *mama* or *dada*. The second year of the child's acquisition is dedicated to learning how sounds are used in the phonology of the language. For example, the child may pronounce the words 'mouse' and 'mouth' completely the same, because they are not yet able to produce these sounds in their early years of acquiring the same. When a child starts to acquire word meaning, the general assumption that one could make is that the child sees an object, the parent says a word and the child connects the sounds with the object. Although this sounds quite simple, it rather is not that simple. For a child to learn a word, they would have to figure out that the word refers to a class of objects and not just to the object itself. Meaning, the child is lacking the information about how to use the same word in other situations and what other meanings it could convey. Here we come to the problem of children being faced with impoverished data. Therefore, a child may use the word *daddy* for all men because his father is male, or *mommy* for all females, as children are prone to attach and extend labels to objects in particular ways.

Next, when a child acquires morphology, they tend to make errors due to overgeneralization. This can happen when a child produces words like *goed* and *bringed*, because they treat these irregular verb forms as the regular verb forms that they have heard before. A classic example of such instances would be the "wug test" done by Berko in 1958. In this experiment children

are presented with the word '*wug*' and they need to formulate the plural form of the given word. As the child connects that the plural ending is *–s* as heard from previous examples, he proceeds to create the word *'wugs'* as the plural form of the word *'wug'*. This goes to show that children have acquired the plural rule and not just imitated the words that they have heard. After acquiring these aspects of morphology and some others, the child acquires pragmatics, - i.e., how to use the language that they have learned in context. In most cases, children simply assume that their listener knows who he is talking about or about what, without having actually said or indicated the same. Studies have shown that children have difficulties with understanding the context in which the language is being used at first, and it may take from months to years for a child to develop this ability to understand, but some aspects of pragmatics like the one-word utterance can be acquired at an early stage. After elaborating what child language acquisition is and all its aspects, we can move onto presenting the main two theories that this paper is focused on, Universal Grammar by Chomsky, and Children with plastic brains by Halpern.

3. Universal Grammar

One of the leading theories in child language acquisition is Universal Grammar by Chomsky (1995). In short, his theory suggests that children possess innate knowledge about language, meaning, the human faculty for language is innate. Moreover, "Universal Grammar restricts the number of possible functions that map between situations and utterances, thus making language learnable" (Carnie, 2007). But the question that still remains is how we know certain 'things' about the grammar of our language without ever having them learned. The possible suggestion might be that all humans possess some sort of properties known as universals of language. These principles and parameters exist because we as speakers of human languages share the same basic innate materials that form our language's grammar.

For example, all languages contain subjects and predicates. And an even more interesting fact contributing to universals, is that children, no matter their language and cultural background, seem to make the same mistakes when acquiring their language. All this indicates that language in fact can be seen as a '*genetically endowed instinct'* (Carnie, 2006). Moreover, evidence has been found in neurolinguistics that certain parts of the brain can be linked to specific linguistic functions. Franz Joseph Gall (1800) proposed that different human cognitive abilities and behaviors are localized in specific parts of the brain, also known as the theory of localization.

Going back to Universal Grammar, Chomsky also proposed the following: "*The principles-and-parameters approach dissociates two notions that fell together under the concept of I-language: there is a clear conceptual distinction between the state of the language faculty, on the one hand, and an instantiation of the initial state with parameters fixed, on the other*" (Chomsky, 1995).

Chomsky indicates that on the one hand we have this innate knowledge about language within us and on the other hand we have knowledge that we have learned about the language. Both of these aspects influence one another, meaning, we further develop or 'build' the already possessed knowledge, and also create new knowledge based on exterior factors.

Furthermore, this theory indicates that language is acquired rather than learned. As I have explained in section 2.2., there are parts and aspects of language that a child requires, and then

there are parts that they learn. Children can base their knowledge about language on linguistic structures that are a biologically innate part of the human mind. And as previously mentioned, we focus not only on particular languages but rather the general nature of language. When Chomsky first presented his theory, he strongly disagreed with Skinner's model and with the fact that language is simply learned and not acquired or innate. For him, this model did not properly present how language actually works.

Pinker himself agreed with Chomsky concerning this claim saying that language did not occur simply as a product of learning as proposed by Skinner, but rather something innate. Here, both Pinker (1979) and Chomsky (1995) strongly disagree that children acquire language simply by imitating their parents. Furthermore, Chomsky in his Universal Grammar theory proposed that the input data that the child receives, triggers the appropriate parameters for the language that is being acquired. This means that, "the input determines the choice between parameter values made available by UG" (VanPatten & Wiliams, 2015). This indicates that the child is able to acquire language due to UG. After a rather short and direct introduction to Universal Grammar, we are now going to move onto the arguments for and against UG that were proposed by Christian Hejlesen Christensen (2019) in her essay dealing with the same matter.

3.1. Arguments for Universal Grammar

H. Christensen firstly divides arguments for UG into two categories: -"first, "-the problem of the productive nature of language and the second looking specifically at child language acquisition and the argument from the poverty of stimulus" (Christensen, 2019, p. 14). As far as the first argument concerning the productivity of language is concerned, H. Christensen mentions Pinker's (1994, p. 85) example of a hypothetical twenty-word sentence. When the speaker produces the sentence, and if being interrupted, the speaker or hearer can produce up to ten different words to continue the sentence making it grammatically correct and coherent. Therefore, there could be up to a hundred million trillion different possible sentences, and for a speaker to memorize and learn all of these sentences would take about a hundred trillion years. This example purely demonstrates how language cannot be learnt by simply imitating and memorizing sentences. This goes in favor of the UG model by Chomsky, who goes on explaining that the behaviorist model is rather vague, as mentioned in the chapter earlier. Moreover, the behaviorist model is vague because speakers are proven to produce and understand an indefinite number of sentences, even if they have not heard the specific grammatical structure before. An example given by Chomsky that can be used in favor of this argument are the following two sentences.

(a) Colorless green ideas sleep furiously

(b) Furiously sleep ideas green colorless

Here, sentence (a) is grammatically correct in English, and sentence (b) is not. A speaker can conclude that sentence (a) is grammatical purely on its structure, while sentence (b) is seen as an absurd sentence and not grammatically correct. In short, grammaticality and semantic meaning seem to not be connected, and the speaker determines grammaticality based on structure. Therefore, for the first argument, we can conclude that speakers possess the ability to produce correct grammatical forms, despite the language being vast.

The following argument for UG, includes the poverty of stimulus. Within this argument "the samples of language available to a child are insufficient to explain the adult's knowledge of language" (Crystal, 2008, p. 378). This means that children do not only learn language from their parents and memorize it as such, but rather possess innate language structures within their brains. A great example that can be taken as evidence that was introduced by Chomsky, is when a child must turn a declarative sentence such as "*a unicorn is in the garden*" into a question. We can create a question with the following structure: "*Is a unicorn in the garden*?", or we can add two *is's,* and get the following sentences: "*Is a unicorn that eating a flower is in the garden? And Is a unicorn that is eating a flower in the garden*?". We can conclude that only the second question is grammatically correct, but we are interested whether the child will produce the identical sentence when asked or whether he or she will produce something else. From former experiments, such as the one done by Crain and Nakayama (1987), which tested the child's ability to form questions from sentences that contained more than one *is,* every child succeeded in creating a grammatically correct question. This proves that children possess innate language structures within their brain, because even if they have not heard such structures from their parents, they can still successfully produce them. Moreover, even if children are likely to be exposed to a simplified version of the language, making it less likely for them to hear complex grammatical structures, they can still manage to produce complex and correct grammatical structures. And even if we take into consideration the mistakes that children might make when producing these structures, they still occur very rarely or even never. In conclusion, these arguments strongly support the idea of UG and provide legitimate evidence making this theory valid in certain aspects that were observed. Although we have strong evidence for UG, like every theory, it can contain flaws, such that will be presented in the following chapter dealing with arguments against UG.

3.2. Arguments against Universal Grammar

H. Christensen took Halpern's approach as the main argument against UG, the same approach that is being evaluated in this thesis. Interestingly, this approach argues that the child's mind or brain is 'plastic', meaning that it does not acquire language, as proposed by UG, but rather is being shaped by the language it hears. "It is language that turns the brain into a mind, and it would be more accurate to say not that the child acquires language, but that the language acquires the child" (Halpern, 2015). In other words, the child memorizes the language, makes a connection between the similarity of circumstances that the word is used in, and later on uses the same in their language production. Halpern, in order to further prove his approach, compares the child's brain to a computer hard drive. He explains that just like a computer, a child's mind possesses an "indexing tool that scans every string of textual input" (Halpern, 2015). The data gathered is then not only stored in the child's mind but the mind itself builds a structure for it. Among other evidence, he also refers to feral children who fail to comprehend and produce human language, due to the fact that their brain has not fully been formed by human language, but he also discredits this evidence later on in his paper. Halpern's approach seems to be connected to the behaviorist model, which UG discredits, but it can also be seen as vague due to the lack of neurological and linguistic evidence.

The second argument against UG that was presented by H. Christensen, refers to Lin's article (2017) that fully deconstructs Chomsky's methodological approach. In his article, he focuses on subjacency that "is the principle that linguistic movement cannot cross more than one bounding node, with bounding nodes being IP and NP" (Lin 2017, 3). He claims that this principle is based on English data and cannot be applied to every language, therefore the theory that UG is universal, can be discredited as a whole. He goes on explaining that one would have to study all languages in order to prove that UG is universal, but even then, it still would be questioned whether UG really is universal. He states the following: "No matter how many sentences in how many languages UG theorists have examined, the version of Subjacency posited on the basis of those data cannot be regarded as the law governing movement of words in human languages" (Lin, 2017).
After presenting arguments both for and against UG, in the following chapter I will present Halpern's approach on how children acquire their language.

4. Halpern on how children learn their mother tongue

After presenting one of the theories in the field of first language acquisition, Universal Grammar, I will now discuss the "third possibility". But before I start my discussion, it is crucial to mention that the first possibility refers to the behaviorist model and the second possibility refers to Chomsky's Universal Grammar. The third possibility is an approach suggested by Halpern, who states the following; "The third possibility is that the mind of the infant—or better, his brain—is so unformed at birth, so plastic, so malleable, so much more impressionable than even the traditional philosophic *tabula rasa*, that it does not *acquire*, but is *formed by*, the language it hears" (Halpern, 2015, p.2.). In his approach, he is centered on the idea that the child's brain does not acquire language, but rather their brain is formed by the language it is exposed to. This is quite the opposite from the leading UG theory. How did Halpern draw such conclusions to base his approach on? Moreover, how did he conclude that the child does not acquire the language, but rather the language itself acquires the child. The interesting part in his approach is that he claims that the words that the child firstly hears, are unique and are syntactically unrelated items. He then goes on explaining that these words later on are connected within the child's brain and enable the child to make connections based on similarity of circumstances of usage. And if these words are constantly repeated, they will stay in the child's mind, but if not, they will slowly fade. Moreover, once the child turns into a toddler, he will form simple analogies, and make connections that words that sound alike, or share the same meaning must be, for example, pluralized in the same way (Halpern, 2015, p. 3). This may lead the child to make certain mistakes when applying the same form to every word and it may result in the child producing the wrong pluralized form. And lastly, he mentions how our ability to acquire language with such ease slowly fades as we get older.

On the one hand, this approach seems to agree with the early mentioned Skinner behaviorist model, which claims that language is learned rather than acquired. In this model the child hears the word, learns its form and tries to connect it to other words and structures. Although Skinner claims that parents are the main source of linguistic input and that they shape the child's mind, Halpern does not make the same connection directly. Halpern does claim that the language forms the child's brain but does not specify that the language is strictly produced by the parents.

Moreover, Halpern mentioned how linguists have failed to recognize this "third possibility", because they were misled by the meaning of the word '*learn*'. The initial meaning would be that learning is a conscious process to acquire certain skills and knowledge, when, as Halpern (2015, p.4.) claims this cannot be observed among children, as children unconsciously acquire a language. Therefore, a question that can arise is what children are then actually doing. Are they learning a language, acquiring a language or something else? When fully examining Halpern's approach I find some statements and suggestions to be rather confusing, and to be perhaps vague suggestions without any linguistic evidence supporting it. On the other hand, let us focus on Halpern's claim that children produce mistakes when they first acquire language and try to produce more complex analogies (Halpern, 2015). As it has been studied within the field of first language acquisition, and as I have mentioned it in the chapter above, children are likely to make mistakes, but experiments like the 'wug' test (Berko, 1958), have proven that the child does not frequently make mistakes, and if they do make them, they are rather insignificant and the child quickly learns to correct them. Therefore, I do agree with Halpern's claim that children make mistakes, but these mistakes are rather insignificant and a necessary part of the acquisition process later on.

Furthermore, we can closely look at Halpern's statement word by word. He refers to the brain as unformed, because it is ready to be formed by the language that the child will be exposed to. He supports this claim with an example of an experiment done with a pygmy chimpanzee (Halpern, 2015. P. 5). In this experiment, the goal was to teach the foster chimpanzee mother some English but had poor results. Instead, the infant chimpanzee, that the adult chimpanzee was fostering, had picked up the language far faster and better than its foster mother. Turns out that the infant, who did not pay much attention to the lessons, had picked up more due to him being an infant whose brain simply acquired the language that it was exposed to. And due to having an infant child-like brain, the chimpanzee acquired English far more easily than his adult foster mother chimpanzee (Halpern, 2015. p. 5).

Although, there had been no connections between infant chimpanzee acquisition and children language acquisition, I find this to be an interesting example to support Halpern's claim, but also a rather vague one. I do find the idea of a "plastic brain ready to be formed" quite intriguing, but it lacks important linguistic and biological evidence. Even though UG can be also seen as vague, there is still far more neuro linguistic evidence on the fact that children already possess some knowledge of language, than on the fact that a child's brain is plastic. Moreover, even if it may seem that a child is born with a brain that needs to be formed by a language, and we cannot deny the fact that language most definitely forms the brain, it still does not define how children already possess certain knowledge of language without it ever being explained to them. Specifically, it does not explain how children can form correct questions with the proper grammatical structure without being instructed on where the particular sentence element must stand (Fromkin, Rodman and Hyams, 2014, p. 401), nor how children produce only one word but convey the meaning of the whole sentence. That is, how is the child able to say one word, like 'up', with the meaning of an entire sentence like "Pick me up." or "I want to be picked up" (Fromkin, Rodman and Hyams, 2014, p. 401). How does the child know that 'up' refers to that action or sentence, even if they are not able to produce the whole sentence themselves yet, or even if they do not fully comprehend the meaning of those words. This is where UG comes in hand, but again some questions are still left to be unanswered.

Moving onto the next part of Halpern's statement is where he states that the brain is formed by the language it hears. For example, an infant after being born already produces a set of sounds, sounds that can mean they are in pain, they feel uncomfortable or that they are hungry. These sounds were not introduced or produced by their parents, nor were they taught to the child. So why does a child already by birth try to use language without ever being taught the language? Even if they are just sounds, they are still considered part of language as they convey a meaning that the child is not yet capable of fully comprehending. Why does the child's brain automatically acquire sounds from birth? Why could not the brain simply acquire the language but rather must be formed by it? Why could not the mind find a way to communicate, even if the mind has not been taught to have a need for this? For this reason, this part of Halpern's statement seems rather confusing as it is not completely clear as to why the child's brain is formed by the language and not simply acquired. This can to some seem like a play of words, but if we look at the statement and the meaning of the word 'form' in this statement, perhaps Halpern meant that the child's brain does not consciously and actively acquire the language, but rather lets the brain be formed by the language it hears. In explanation, the child's knowledge of the language will strictly depend on the linguistic input it receives from its surrounding environment, and additionally, the child will be only able to produce what it has heard. This would mean that the child could not draw conclusions on their own and could not produce complex grammatical structures or anything similar without firstly hearing them. Since, it has already been proven that children can produce more complex structures using language without it being explained to them, such as the example with the "wug" test (Berko, 1958), this part of Halpern's statement seems not to be so liable.

4.1. Children with 'plastic' brains

Perhaps one of the main reasons I have chosen to focus on Halpern's approach, was the following statement he made about children's brains:

"*is so unformed at birth, so plastic, so malleable"*. (Halpern, 2015, p. 2)

The very word plastic is what grasped my attention, as to why Halpern chose to use this word to describe the child's brain. Why should the brain be plastic? What does he even mean by plastic brains? How could he support this claim? I will discuss this matter in the following paragraphs.

Firstly, let us clearly explain what Halpern meant by 'plastic' brains. He referred to the infants' brain structure as almost completely unstructured, and therefore the language could form the brain structure and the child would be able to learn the language. Moreover, he draws a comparison to a child's brain being a "tabula rasa" (Halpern, 2015. p. 2), i.e., an empty board, that is, it is empty only up to the point when the child starts to learn the language, and then the brain structure starts to change and is no longer a "tabula rasa". He suggests that the language "turns the brain into a mind" (Halpern, 2015, p. 3), which would also mean that the brain would need language in order to develop into a mind. In short, he suggests that the language acquires the child and not the other way around. But how is this possible? What has led him to make such suggestions about an infant's mind? He proposed that the child accepts the words he had heard from his language environment and then stores them in his memory, which according to

him is originally empty and unstructured at birth, making it easier for the child to learn the language. He then goes on explaining the child's process of learning a language as seen in the following;

> '"*Within the infant brain connections between words are made, to start with, on the basis of propinquity and similarity of circumstances of usage, with connections reinforced by repetition, and slowly fading if not repeated. As the infant becomes a toddler, he begins to use simple analogies, such as thinking that words that sound alike, or have similar meanings, must be pluralized alike. Sometimes these analogies enable him to jump a little beyond where his raw data would take him, sometimes they cause him to make mistakes that constitute small setbacks; the net effect on the language-acquisition process in the very young child of such analogizing or generalizing is small — a good thing, because such efforts at being "logical" are as often misleading as they are helpful . And the reason why our ability to acquire a language effortlessly ends, for almost all of us, at puberty at the latest, is that our brains are by that time no longer sufficiently malleable, unstructured, and empty.*" (Halpern, 2015, p. 3)

Interestingly, he made it seem as though the complex nature of acquiring a language is rather not that complicated. Let us look more closely into his words. Firstly, he refers to some type of connections, but does not specify or closely elaborate them. What are these connections, are the neural, or are they biological, or grammatical, or pragmatic or similar? Moreover, how could a child make connections based on some type of circumstances of usage if he does not possess the knowledge to even understand that he needs to use these words. Even more confusing is the fact that he states that if those words that the child hears are not repeated, they will fade, and the child will not remember them. He claims this, even if evidence from research on linguistic input in L1 acquisition has proven that children do not learn by imitating or storing sentences, but rather by constructing a grammar.

Moreover, how could a child then formulate and produce sentences that they have not heard before if they allegedly only imitate and repeat sentences. This would mean that the child's language development would be only constrained to the linguistic input they receive in a given language environment. That is, the child will only understand and produce a limited set of sentences or words gathered from the linguistic input that he had been exposed to. This obviously cannot be seen as plausible, because research on L1 acquisition and experiments like the Wug Test, have proven that a child does not learn language by simply imitating and repeating a sentence, but rather, they learn the language by constructing a grammar that allows them to produce an unlimited set of sentences, grammatical structures and similar.

Therefore, Halpern's suggestion seems to fall into water, because it lacks supporting evidence and has been proven wrong on the basis of the former research done on L1 acquisition. Additionally, he mentions analogy which simply refers to when the child uses the sentence that he had heard as the basis to form other sentences. The problem with analogy is that it implies that children also know when not to apply this "general rule" to other sentences. That is, a child would also know, for example, the irregular plural forms of nouns, which he of course does not know. Therefore, this suggestion also cannot be plausible, as analogy and imitation are both based on the assumption that the child acquires a set of sentences and not a set of grammatical rules and linguistic structures that allows the child to expand their knowledge about language.

Secondly, he claims that children make mistakes when applying analogy and can end up producing, for example, wrong pluralized forms or incorrect tense forms of verbs, or he claims they can go beyond their linguistic data. Another problem arises here, as he had again not explained what he meant by saying "*enable him to jump a little beyond where his raw data would take him*" (2015, p. 3). Would that mean that children are after all able to produce sentences or grammatical structures that they have not heard? It seems quite confusing to me how Halpern firstly suggests that the child learns the language by repetition and imitation only and implies that this is their core knowledge about language, but then goes on suggesting that the child can also make connections and produce linguistic data that he had not heard. Would that not then imply that children after all do possess some innate knowledge about language that helps them produce sentences they have not heard? Because how could we then account for children producing, for example, correct plural forms for certain nouns?

Even though, Halpern also suggests that children make mistakes and overgeneralize and apply rules to other similar structures or words, he does not imply why children are able to make these mistakes nor on what do children base their conclusions on. That is, he does not explain what can account for a child to produce a new set of sentences or words, if he only is supposedly able to produce a certain set of sentences that he had learned. How can a child go beyond his knowledge if he is set to only possess certain knowledge of a language that he was exposed to? Moreover, he claims that when we get older, we lose the ability to acquire language effortlessly and fast because the brain structure is no longer empty. He failed to provide supporting evidence for his statement here, and again is basing his approach on mere suggestions rather than elaborating and supporting his claims. To conclude, Halpern's assumptions that were presented in the previous paragraphs may seem interesting but are rather vague as they lack supporting empirical and linguistic evidence. As he himself states: "*The hypothesis is in one way more ambitious than the UG, postulating as it does a process whose objective is not limited to language acquisition, but is nothing less than the turning of the child into a socialized human being; in another way it is more modest, requiring neither incredible powers of induction on the part of infants, nor a specialized mental faculty uniquely dedicated to first-language acquisition*" (Halpern, 2015, p. 4).

4.2. Evidence for the third way

Moving onto the discussion of the evidence that Halpern provides for his approach or "the third way", I will firstly present his main evidence that he took to support his claims. I will then go on to discuss both for and against arguments for each evidence based on former research done in the field of L1 acquisition, as well as taking experiments as examples to support my point of view. Lastly, I will draw a conclusion and state whether the evidence that Halpern has gathered can be seen as vague or as actual linguistic evidence supporting his approach.

The first evidence Halpern takes is a study done on apes to awaken their true linguistic capability. The study revolves around an adult bonobo Matata (pygmy chimpanzee) who the linguists are teaching English, but with very little success. It must be noted that I have searched for this particular study but could not get access to it, therefore I will be relying on Halpern's description of the study itself. According to Halpern (2015, p. 5), the young bonobo Kanzi, who Matata was at that time fostering, had been more successful in learning English than

Matata herself. Even though the lessons have not been directed to Kanzi, she managed to learn more than Matata. As Halpern notes, this could account for the fact that Kanzi had a brain similar to an infant child. That is, because Kanzi was young and the brain was not fully developed, it helped in learning the language far more than Matata. Basically, Kanzi had the advantage of being young and her brain being plastic and receptive. As Halpern himself notes, there had been no studies done on UG among bonobos, and therefore even if this evidence seems interesting, it is rather vague. Firstly, due to the lack of evidence that young bonobos have brains structured in a similar way as an infants' brain, possessing UG. Secondly, perhaps this distinction based on age (young vs. adult) has nothing to do with the fact that the older bonobo was not as successful in learning English as the younger bonobo. Perhaps there is another reason that can account for this matter, but this is not part of the discussion of this paper, therefore we will end it here. Lastly, this type of evidence cannot be taken as evidence for human brains, even if there might be some similarity between a child and bonobo brain, there are still many questions left unanswered and many factors left to be examined. Therefore, to conclude, Halpern's first evidence does not support his claims, nor can it be seen as neurolinguistic or linguistic evidence in favor of his suggestions.

The second evidence presented by Halpern are cases of feral children. Halpern claims that the lack of exposure to human language leaves them being mentally unformed. But again, as he himself states (2015, p. 5) these children have lacked more than just language exposure and therefore this evidence again seems to be rather vague. Research that was done on feral children has proven that even if the child is able to learn a large vocabulary, or abstract or concrete terms, their grammatical skills had never fully developed (Fromkin, Rodman and Hyams, 2014, p. 477). This evidence cannot be seen in favor of the UG model by Chomsky, because if the children did indeed possess this innate knowledge, they would be then later on able to acquire the language and construct a grammar. But again, it has been proven that after a certain age it is harder to acquire a language, but it must be noted that this is still a fairly unfamiliar field of research. Therefore, this evidence can neither be seen as supporting evidence for Halpern's approach, nor as a counter argument against UG. I would suggest that this can be seen as a rather gray area that still lacks research, and only when researched further could we be able to make such assumptions as Halpern did. To conclude, again this type of evidence is rather vague and does not contribute to Halpern's hypothesis.

Lastly, Halpern refers to the child's remarkable ability to learn a large vocabulary. This in fact is true, as a lot of studies in language acquisition have shown that children are indeed capable of remembering and storing a large number of words. Halpern referred to Pinker's claim (1994) that a six-year-old knows about 13,000 words. Even though this supports Halpern's approach to some extent, it does not support the claim that children learn a language by only repeating and imitating words that they store in their brain. In fact, it contributes to the fact that children are able to memorize more linguistic data from an early age on. But to take this as evidence that the child's brain is plastic, would not be plausible, because it still does not account for how children later on make connections in their brain to form new unheard linguistic data.

Furthermore, Halpern does state that children acquire these words unconsciously, unlike adults who do it consciously. In fact, he states that children have some sort of "hunger" for new words. But why do they have this hunger and how would they satisfy it? Halpern (2015, p. 6) states that the child needs words in context and not just to hear the word itself. He needs to learn when and how to use it. Therefore, he himself challenges his own hypothesis that is based on

the fact that children simply repeat and imitate words in order to learn a language. Moreover, he states the following about the child's brain: *"He is only incidentally increasing his vocabulary; he is mainly enabling his brain to understand the world by organizing itself to match what he knows of it, and thereby turning it into a mind"* (Halpern, 2015, p. 6). In short, he states that in order for the child' brain to become a mind, the child must not only remember the words but also know how to use them. Wouldn't that mean that the child would have to make some connection between the meaning of the word and the word itself? Does this then not indicate that the child indeed does possess some innate knowledge to be able to make these connections? What type of connections are we even talking about? Does that not mean that the child, again, does not learn the language by simply just repeating it? There are still many questions left unanswered, whenever we try to explain and go into detail with Halpern's idea about plastic brains. Although, this is only a suggestion and as he himself mentions, that there had been no concrete evidence to fully scientifically support this idea, unlike the UG model has, it can still be seen as an interesting matter to look further into.

In conclusion, the evidence presented by Halpern can be seen as rather vague and lacking concrete neurolinguistic and linguistic evidence. And as he himself states: "The evidence just introduced is, I think, strongly suggestive, but not decisive" (2015, p. 6). There are still a lot of holes that need to be filled in his approach, but besides that it can still be seen as an interesting point of view. Personally, I think Halpern's hypothesis should be further looked into and should be compared to other theories, besides UG that is the focus of this paper. Perhaps in the near future in the field of child language acquisition we will actually come closer to knowing how and why a child acquires language. In the next chapter I will compare Chomsky's UG model and Halpern's approach by presenting not only both of the theories but by examining neuro linguistic evidence for each.

4.3. Universal Grammar and Halpern's approach

In this chapter I will again shortly introduce both Universal Grammar and Halpern's approach, and then compare both of them with one another. I will then go on presenting evidence to support UG and Halpern's approach. Lastly, I will draw conclusions based on former research and implement suggestions for further research.

Firstly, I will again shortly present Universal Grammar by Chomsky (1995) and explain its principles and parameters. This theory suggests that a child possesses innate knowledge that helps him acquire a language. This innate knowledge is part of the child's biological endowment and helps the child acquire a language quickly and effortlessly. Chomsky indicates that we possess not only innate knowledge, but also language knowledge that we have learned. But what is innate knowledge? How do we gain it? Are we just simply born with it? What are these principles and parameters? Here a logical problem arises, a problem that Chomsky refers to as "Plato's Problem" or the logical problem of language acquisition. How do we come to know how to form and recognize well-formed sentences and distinguish them from ill-formed sentences? This has still been left unanswered, because although we can make assumptions that we possess some type of innate knowledge, we still did not answer the question of why we possess it and how we can access it. Chomsky's UG model is close to explaining some

unanswered questions, but again this field of child language acquisition still is left to be further researched. What we can conclude is that: "It is seen as a logical problem because there appears to be a profound mismatch between the richness and intricacy of adult linguistic competence, illustrated by the examples given in (1), and the rather short time taken by language acquisition coupled with small children's seemingly limited cognitive capacities" (Huang & Roberts, 2016, p. 309). This argument will lead us to poverty of stimulus. In short, the poverty of stimulus accounts for the fact that children not only learn language from their parents and memorize it as such, but rather possess innate language structures within their brains. The whole argument of poverty of stimulus has been well summarized in the following paragraph by Hauser, Chomsky, and Fitch (2002) (as cited in Huang and Roberts, 2016, p. 310):

> *"The astronomical variety of sentences any natural language user can produce and understand has an important implication for language acquisition … A child is exposed to only a small proportion of the possible sentences in its language, thus limiting its database for constructing a more general version of that language in its own mind/brain. This point has logical implications for any system that attempts to acquire a natural language on the basis of limited data. It is immediately obvious that given a finite array of data, there are infinitely many theories consistent with it but inconsistent with one another. In the present case, there are in principle infinitely many target systems … consistent with the data of experience, and unless the search space and acquisition mechanisms are constrained, selection among them is impossible…. No known 'general learning mechanism' can acquire a natural language solely on the basis of positive or negative evidence, and the prospects for finding any such domain-independent device seem rather dim. The difficulty of this problem leads to the hypothesis that whatever system is responsible must be biased or constrained in certain ways. Such constraints have historically been termed 'innate dispositions,' with those underlying language referred to as 'universal grammar".*

In short, the child's adult-like knowledge can be seen as innate, something we are born with, something that is already a part of us. Or we can refer to it as UG, i.e. it provides us with some sort of a bias or limit for possible grammar that is activated when exposed to people speaking, and adult competence can be seen as a result of nature (UG). But does this knowledge apply to all languages? How can an English and a Croatian speaking person have the same UG model, if they have learned different languages? How can they both possess the same knowledge about language, when they learn entirely different languages? To answer this, we need the notion of parameters of UG. With the Principles and Parameters conception of UG and with different Primary Linguistic Data (PLD), a person learning English is able to set his UG parameters in a way that helps them become an English speaker, just in the same way as a person learning Croatian would do. This would indicate that language acquisition adapts to the parameter values provided by UG based on the experience determined by PLD. In short, we are born with principles and parameters of UG within us that allow us to acquire the language based on PLD. To help us understand some of these parameters better, in the following paragraph I will discuss parameters presented by Huang and Robert (2016, p. 311-318).

The first parameter is the Head parameter. It refers to heads and complements and suggests that all languages are either rigidly head-initial or rigidly head-final. According to recent studies, researchers like Kayne (1994), state that "complement–head order cannot be directly generated but must be derived by leftward movement (in the simplest case, of complements)." (Huang and Roberts, 2016, p. 312) Others like Takano (1996), Fukui and Takano (1998), and Haider (2012:5), propose that surface head–complement order is being derived by head movement (Huang and Robert, 2016, p. 312). Another parameter is the Null Subject parameter. This refers to when a pronominal subject of a finite clause is either expressed as a subject or left unexpressed in a language. This instance occurs frequently in languages and most of them have a null subject in their grammar. Furthermore, we have the Null Topic parameter that according to Huang (1984), allows arguments to drop if constructed as topics in certain languages. Both of these parameters give us "four language types:

a. [+null subject, –null topic]: Italian, Spanish, etc.

b. [+null subject, +null topic]: Chinese, Japanese, European Portuguese, etc.

c. [–null subject, –null topic]: English, Modern French, etc.

d. [–null subject, +null topic]: German, Swedish, etc." (Huang and Roberts, 2016, p.314.)

Another parameter that is important is the Wh-Movement parameter. With this parameter we are given the option to place a wh-constituent or leave it in a wh-question. Movements of such constituents are frequently seen in English. Following, we have the Nonconfigurationality parameter which refers to languages having a highly unconstrained word order. Hale (1983) claims that phrase structure does not have to directly present argument structure. On the other hand, we have the Polysynthesis parameter that involves the question of whether all arguments must show overt agreement with the main predicate. Furthermore, with this parameter we test out whether a language allows noun incorporation. Noun incorporation simply refers to morphosyntactic constructions in which a noun forms a close unit with the verb. The following Nominal Mapping parameter involves mapping from syntax to semantics. According to Huang and Roberts:

"*Chierchia observes that two features characterize the general semantic properties of nominals across languages: they can be argumental or predicative, or [±arg(ument)], [±pred(icate)], reflecting the general fact that nominals can function as arguments or predicates, as in John(arg) is [a doctorPred]. The parametric variation lies in which of the three possible combinations of values of these features a given language allows*" (Huang & Roberts, 2016, p. 316).

The last parameter is the Relativized X-bar parameter that presents functional categories which have Specifiers. Fukui (1986) states that these functional categories can be absent as a parametric option. Some languages like Japanese, for example, do not have a landing site for wh-movement, nor a dedicated subject position, unlike those visible in English. After briefly presenting the parameters for UG that have helped us understand language a bit further, now I shall move on to presenting Halpern's approach in the following paragraphs.

Firstly, Halpern's approach revolves around the idea that children are not born with innate knowledge but rather let the language shape their brain. The main hypothesis includes the term plastic brain which has been explained in the previous chapters (cf. section 4.1.). Another

interesting point of view that Halpern adds to his idea is comparing the infant's empty and unstructured brain to computer analogy. He goes on explaining that computers have a main storage that is empty when you purchase it, that is, the parts that the user needs are empty. So how is this of importance? To explain further, let us look at Halpern's statement:

> "*It's understood that it will contain, in the part reserved for the operating system and other manufacturer-supplied software, a number of programs - programs without which the computer would be a lifeless lump of metal. It is in this sense that I call the infant's brain empty and unstructured — as in the computer, that brain, or perhaps the entire nervous system, contains many programs, ready to go to work when triggered by birth events. But even after accommodating all this "system software" the infant brain remains both enormously capacious and eager to have structure imposed on it. And one of the mental programs so triggered is roughly analogous to a utility program that is now often a regular part of computer system software: an indexing tool that scans every string of textual input and builds an index to it, thus not only preserving the data but, by making connections explicit, building a structure for it. In much that fashion I envision the programs in the infant's brain accumulating and organizing the language he hears, and in the process structuring that brain*" (Halpern, 2015, p. 8).

In short, he claims that the infants' child is prewired with certain 'programs' that are waiting to be activated by birth. That is, the so-called 'programs' help the child learn and organize the language they hear. It is of importance to be noted that here Halpern in a way claims that children possess some type of knowledge or information about the language even before the language starts to shape the infants' brain. That would indicate that there might be a possibility that he is referring to innate knowledge, such as found within the UG model. This part of his hypothesis I find rather interesting, as he himself firstly claims that children are born with empty, plastic and unstructured brains, yet he compares it with computer analogy, that indicates that the infant may possess some type of 'programs' that are waiting to be awaken by the first encounter with language. Therefore, here I find myself in a state of confusion and confliction, as I have not yet fully understood whether Halpern to a certain extent agrees with Chomsky's' UG model, proposing something similar, or whether he fully disregards Chomsky's' theory.

Going back to elaborating Halperns' approach, as mentioned and explained in the former chapter (cf. section. 4.1. and 4.2.) he mainly revolves around the hypothesis that children have plastic brains but fails to provide the supporting evidence in favor of this claim. He suggested testing out his hypothesis by creating an experiment where the infant is exposed to two languages that are grammatically different. This would leave the infant with a smaller chance of constructing a grammar, as Halpern claims. And for example, if infants grew up in a bilingual environment, they would still be as successful as infants in a monolingual environment while constructing a grammar, which of course goes against Chomsky's alternatives and more in favor of Halpern's approach. The proposed experiment would be an interesting idea to test out but may not lead to support for Halpern's approach. Chomsky allegedly did take into consideration testing his model in a similar way but disregarded it, and as he stated the following: "*The language of such a [mixed-language] speech community would not be 'pure' in the relevant sense, because it would not represent a single set of choices among the options permitted by UG but rather would include 'contradictory' choices for certain of these options"* (Chomsky 1986, 17).

After shortly again introducing and elaborating both the UG model and Halpern's approach, in the following paragraphs I shall compare both of them using evidence found in favor of both the UG model and Halper's approach. Lastly, I will provide a conclusion based on the evidence presented.

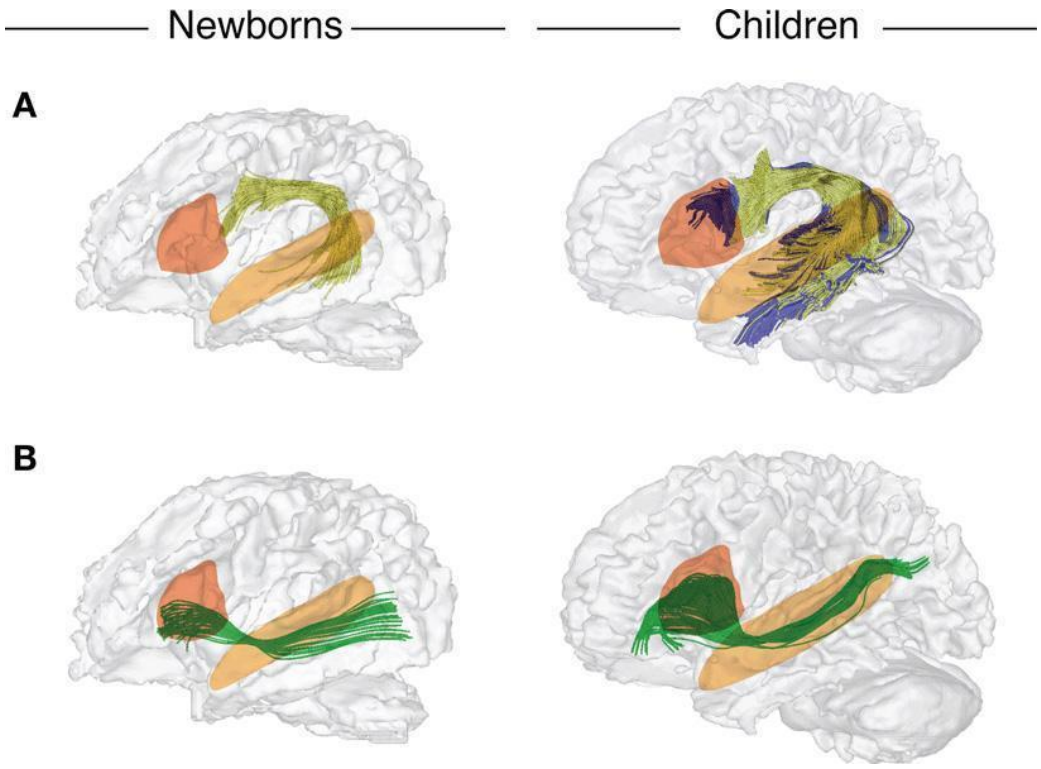
Firstly, let us start with the 'innate' vs. 'learnt' argument. Chomsky claims that infants possess innate knowledge that helps them learn their mother tongue effortlessly and fast. Infants use principles and parameters to help them organize and understand the language. But how do we know that they in fact possess this innate knowledge? How can we know that infants for a fact understand language even before learning the language. Evidence in that favor can be found in several L1 acquisition research. One such is where infants show an early response to different properties of language. For example, one study shows that if the infant is familiar with certain words, stress patterns or sounds, it will react by turning their heads towards it. But interestingly enough, "they will also respond to novel patterns which can indicate that they for a fact can distinguish the different linguistic elements being tested" (Fromkin, et al., 2014, p. 399). Moreover, another example is in an experiment where infants whose mother tongue is English are able to distinguish between native and non-native stress patterns. Some studies also show that infants who acquire English will use stress cues to segment words in fluent speech (Fromkin et al., 2014, p. 402). But how does an infant know which stress pattern he is dealing with? Does that mean he would have to know the language in order to learn the language? We can say that this is a classical chicken and egg problem just like Fromkin, Rodman and Hyams (2014, p. 403) suggest. This is where the parameters of UG come in hand, as they help the infant choose between already specified values based on the language that he hears around him. In short, these parameters can help the child acquire the language more easily. To conclude this set of evidence in favor of the UG model, we can claim that children are not taught language but rather extract rules from the language that is being spoken around them. As it has been proven by several L1 acquisition research and experiments, that the ease with which children acquire language, and the coordination of stages of development for all children and all languages, indicate that language faculty is indeed innate. It must be noted, that even if methods like imitating adult speech, or reinforcement and analogy have been proposed, they still do not explain how a child is able to produce new sentences according to the rules of their mother tongue.

Moving onto another set of evidence supporting this view that language faculty is innate, are found in non-invasive methods for studying the living brain, processes like measuring electromagnetic activities or imaging techniques like CT, MRI, or PET scans. According to Fromkin, Rodman and Hyams (2014, p. 485), studies like these have provided evidence of "neural reflexes of various linguistic categories and constraints, such as categorical perception, phonotactic constraints, and wh-movements" (Fromkin et al., 2014, p. 485). Moreover, all of these studies, some of which I will further elaborate in the following paragraphs, indicate that grammatical processing is automatic and attention-free, more like a reflex. Again, this goes in favor with the UG model and the hypothesis that language is innate. It must be noted that even though most of these studies have been conducted on adults, there are also some that have been conducted on children, like children that have undergone split brain surgery. Furthermore, it has been proven that the center for language is located in the left hemisphere and that the process of acquiring a language comes very early in life. Even more fascinating is that several neuro-linguistic studies have proven that "the organization of language and grammar in the adult's brain is already reflected in the brains of newborns and infants" (Fromkin et al., 2014,

p. 485). I will take an article by Jens Brauer (2014) who investigated the nerve fiber connections in the brain and demonstrated a newborns' and a seven-year-old children's brain network using MRI. The following picture has been taken from this article, as well as the text latter following.

Figure 1

A newborns' and a seven-year-old children's brain network using MRI



Note. Brauer, J., Neuropsychol., The Brain and Language: How Our Brains Communicate · Frontiers for Young Minds (frontiersin.org)

"The two important language regions of the brain are highlighted in red and orange. The technique of magnetic resonance imaging provides images of the nerve connections between the two language regions. The lower nerve [green (B)] connects these regions of the brain in both newborns and children. But the upper nerve between the language regions [blue (A)] is only observed in children, not yet in infants. However, infants already show a connection to a directly neighboring region [yellow (A)]. This means that the language network in infants is not fully established yet. The important connection by the upper nerve still has to develop. On the other hand, the network shown for children is already very similar to that of adults and shows two network connections, an upper one and a lower one" (Brauer, 2014).

Another such example can be found among ERP (Event-Related Potentials) studies that have shown there is a neurological correlation of categorical perceptions in infants just like for adults. In explanation, the infant brain responds differently, in the same pattern and speed as found in adults, when it comes to phonemic categories and to non phonemic acoustic distinctions. This again goes in favor of the UG model, as it indicates that infants are not simply born with a 'plastic and unstructured' brain, but rather already possess some type of knowledge about language. It is crucial to mention, that once again, it has not been proven directly how this knowledge comes and why it exists, nor where it is located in the brain, but theories such

as UG can be seen as a fairly good start in understanding the complex nature of acquiring a language.

On the other hand, let us move onto the 'learnt' argument that Halpern disagrees with. He claims that language shapes the child brain and that language turns the brain into a mind. Although, he himself states that even if the evidence that he put forward is not as strong and decisive as the ones found for UG, he still puts an emphasis on finding a 'third way'. To support his claim, he took the example of feral children (cf. section 4.2.), which again is rather vague as it lacks neurolinguistic and empirical evidence. Moreover, these studies actually prove that the children can in fact learn a large vocabulary, but not grammatical skills. This would indicate that children can learn part of the language such as the vocabulary, but after a certain age or after a longer period of isolation from human language, it becomes merely impossible to acquire the language in a way that an infant would acquire language. This of course influences language development and can lead, as seen from the example above, to the disability to acquire certain aspects of language. Furthermore, this could indicate that children perhaps do not possess innate knowledge about language, as suggested by Chomsky, but rather learn the language. It is important to emphasize that this particular example of feral children cannot be seen as evidence for supporting UG model nor Halpern's approach, as it does not include some of the crucial factors that need to be taken into consideration, as again these children did not only lack contact with human language but contact with many other things that might influence language development in general.

In conclusion, when comparing both UG and Halpern's approach, Chomsky's theory seems to be more plausible as it has more supporting neurolinguistic, linguistic and empirical evidence, rather than Halpern's approach that is based just on assumptions. Although Halpern's approach and the idea of 'plastic' brains seems interesting, as seen in this chapter, it still lacks supporting evidence. This field of children language acquisition is still left to be explored, and for that reason we cannot claim for sure that even the UG model is the correct and only model that best describes how child brains acquire language. In short, further research is suggested, specifically in the field of ERP which has allowed us to examine language and the living brain using a non-invasive method.

4.4. Using Pinker's criteria to test Halpern's approach

After presenting Halpern's approach, comparing it to Chomsky's UG model and discussing evidence for and against, I will discuss this approach using Pinker's criteria for a good theory. The criteria by Pinker (1980) that was previously introduced in this paper (cf. section 2.1.) was taken by Halpern himself to test out whether his approach can be seen as an actual theory within the field of L1 acquisition. It must be noted that all these criteria refer to child language acquisition and language in general. One of the first criteria is the Learnability Condition, which according to Halpern is satisfied, even if his approach rejects the notion of ''learning''. Therefore, I do not quite understand how this criterion is satisfied if it does not involve the notion of "learning" that is of crucial importance to this criterion. Moreover, the explanations provided for each criterion by Halpern, are rather short and not informative. For this criterion Halpern referred to how children not only learn sentences and words but also learn to express meanings in sentences. Halpern does go in the similar direction, but instead of saying that

children learn a language, he says the language shapes the brain. He also mentions that children do not just simply repeat sentences but also make some type of connections in their brain to be able to understand and produce new sentences. This indicates that Halpern's approach might satisfy this criterion but only to a certain extent.

Secondly, we have the Equipotentiality Condition, which states that a theory cannot be, in this context here, related to only one particular language. Halpern does refer to human language in general and not to a particular language like English or German, therefore this criterion is fully satisfied. Next, is the Time Condition criteria that indicates that the child must be allowed to learn the language within normal time, or as Halpern mentions, within three years. This criterion is satisfied because Halpern does actually mention how a child brain can no longer be effortlessly shaped by a language with such ease after they turn to adolescence. He mentions how adults have a harder time in mastering a new language, as their brain is no longer infant-like. Moreover, this can lead us to the Critical Period Hypothesis that states the same but is now not the focus of this discussion. Moving onto the next criterion which is the Input Condition. With this criterion an emphasis is put on the input that the infant or child receives. As Halpern himself discussed, input is of importance when acquiring a language and can significantly influence language development. A lack of such input can be found in his example with feral children who have had no linguistic input available to them and that left a significant mark on their language development.

Next, Halpern refers to the Developmental Condition that includes knowledge about how children acquire language. In explanation, how are children able to produce well-formed sentences, make connections to the meaning of the sentences, know when to use the sentences and so on. For this criterion Halpern stated that it was satisfied, even if his approach obviously does not satisfy it. He made a proposal or a suggestion about how a child's brain may function when acquiring a language, but he never provided empirical or neuro linguistic evidence supporting his claims. Therefore, this criterion cannot be satisfied based on pure assumption. Lastly, he turned to the Cognitive Condition where he states the following:
"because it does not ascribe fantastic analytical and deductive powers to the child, nor assume the existence of the UG, a near-mystical entity whose structure and mode of operation are completely unspecified, the theory satisfies this criterion far better than any known alternative" (Halpern, 2015, p. 8). In order for this criterion to be satisfied, it must fit with the known cognitive faculties of children. This criterion clearly cannot be satisfied, as Halpern bases his claims only on assumptions. In his whole paper, there was no concrete neuro linguistic evidence that would support his approach, unlike those found in favor of UG.
In conclusion, Halpern's approach on how children learn their mother tongue has not satisfied all six criteria proposed by Pinker (1980). His approach may seem interesting, but lacks valid neurolinguistic, linguistic and empirical evidence. Even Halpern himself stated that the evidence that he had presented are not entirely in favor of his approach. For this theory to be considered a theory, Halpern's approach does not fulfill crucial factors nor provides valid evidence. Therefore, this cannot be seen as a theory but rather as an interesting approach on how children acquire language, or an intriguing point of view one may say.

4.5. Testing Halpern's approach using a set of general criteria

The last part of my critical overview on Halpern's approach on how children learn their mother tongue, focuses on testing out his approach using a set of criteria proposed by myself based on the literature available to me and former research found on this topic. This set of criteria includes testing it out as a theory, which I have already done using Pinkers' criteria, and the other part includes comparing it to a few already known and scientifically researched facts about children language acquisition.

The first set of criteria refers to testing Halpern's approach as a theory. In the previous chapter I have proven that based on the six criteria proposed by Pinker (1980), Halpern's approach cannot be seen as a theory. My main argument behind this is that his approach lacks evidence. The idea that was presented was very interesting but is based on mere assumptions. Moreover, there has been no research done that has proven that the child's brain is plastic at birth, nor that it is only strictly shaped by the language it hears. On the contrary, numerous neurolinguistic research and experiments, such as the one I have earlier presented in this paper, have provided evidence in favor of UG, that is, that the child actually might possess innate knowledge that helps him acquire a language more easily.

For example, ERP studies have shown that the infants' brain and an adult's brain show a neurological correlation of categorical perceptions. That would mean that even if the child has still not developed the same cognitive and other abilities as adults have, they possess a predisposition to later develop them, as explained in the previous chapters. (cf. section 4.3.) All of this evidence does not go in favor with Halpern's approach and disputes his idea in general. Even the evidence he himself has presented can be seen as rather vague. His example with the chimpanzee experiment is rather interesting, but again no study has made a comparison between human infant brains and chimpanzee infant brains, in order for this evidence to be considered valid.

Moreover, one cannot state that any human being or animal that is an infant shares the same or similar characteristic in brain structure, without it being scientifically proven. When first reading his paper, I was very intrigued by the facts that he presented, but as I further investigated the topic and read former research done on L1 acquisition, I have come to the conclusion that all of this evidence or facts about children language acquisition that he presented are simply just assumptions. One cannot simply claim something without evidence and call it a theory. A theory has certain criteria that it has to fulfill, which as seen in the previous chapter Halpern does not fulfill.

On the contrary, his approach lacks the most important criteria, which is evidence. Therefore, his approach simply cannot be seen as a theory, as it has not satisfied the criteria for a theory, nor has it been tested out and discussed using appropriate tools. It must be noted that he only suggested how to test out his hypothesis, without actually testing it. So, to be strongly suggesting and claiming this 'third way', he would firstly have to conduct an experiment that he proposed and present the result that could later on be discussed to see whether this proves his claims. Only then could he call his approach a theory, when it includes valid neurolinguistic, linguistic and empirical evidence. Moreover, as Long (1990) claims (as cited by Mitchell and Myles, 2004: 6-9) a good theory has:

> *"Clear and explicit statements of the ground the theory is supposed to cover, and the claims it is making. Systematic procedures for confirming or disconfirming the theory, through data gathering and interpretation: a good theory must be testable or falsifiable in some way. Not only descriptions of second-language phenomena, but attempts to explain why they are so, and to propose mechanisms for change. Last but not least,*

engagement with other theories in the field, and serious attempts to account for at least some of the phenomena that are 'common ground' in ongoing public discussion".

Halpern's approach as mentioned earlier, simply lacks evidence and engagement with other theories in the field, it cannot be seen in the same light as for example Chomsky's UG model can. If it was seen in the same light as the UG model, then the approach itself would be tested out and other linguists would have critically discussed it, but I have not found a similar study as his, nor someone who tested out his hypothesis.

The validity of Halpern's approach can also be evaluated in the light of insights from numerous empirical studies available on L1 acquisition. For example, how infants can distinguish stress patterns, a study that I had previously introduced (cf. section 4.3.), as it was proven that infants acquire the rhythmic structure of their language quickly. Seven-and-a-half-month-old infants had to listen to trochaic words such as puppy, and iambic words such as guitar, repeatedly. These words had later been part of a list of words that were played to them. In this study particularly, they have measured the length of time that the infants took while listening to familiar versus unfamiliar words. The study's results showed that children listened longer to familiar words that they have heard from the passage, but only if they were trochaic words. This indicates that infants are taking the stressed syllable to mark the onset of a new word, something that adults also do.

So how can then Halpern claim that an infants' brain is plastic and unstructured, if it is able to already distinguish stress patterns? Wouldn't that mean that the infant indeed already possessed some knowledge, some type of innate knowledge that allows him to easily acquire a language, such as in this case? Moreover, the evidence that ERP studies have gathered is enough to discharge Halpern's approach as a whole. I will not repeat myself and present other facts about L1 acquisition that I have already discussed, but I wanted to point out that Halpern's approach can be easily disputed just by referring to former research that was done on children language acquisition. To conclude, Halpern's approach can again be seen as an interesting point of view, but lacks evidence and can be easily proven wrong by numerous research and experiments done within the L1 acquisition field. The aim of this study was not to propose a new set of criteria for evaluating Halpern's approach or approaches to L1 acquisition in general, but rather test the validity of these approaches on the basis of a) existing literature, b) Pinker's set of criteria, c) empirical evidence from previously conducted studies.

5. Conclusion

In conclusion, I have presented both Halpern's approach on how children acquire their mother tongues, as well as Chomsky's Universal Grammar. After presenting both for and against arguments for both UG and Halpern's approach, I have compared them both based on the former literature and research that was done within the L1 acquisition field. I have gone a step further and tested out whether Halpern's approach can be seen as a theory using Pinker's set of criteria, as well as proposing my own set of criteria. All in all, I have critically discussed Halpern's approach and elaborated why it cannot be seen as a theory. Although his approach may seem intriguing and definitely worth further investigating, it is based on mere assumptions and lacks neurolinguistic, linguistic and empirical evidence. The goals of this study to critically discuss and elaborate Halpern's approach have been accomplished. Although, as mentioned earlier, I did not propose a new set of criteria for testing out the validity of a theory, his approach had still been tested out using the criteria from the existing literature.

To conclude, further research is suggested, especially in testing out Halpern's hypothesis in the way he proposed, by exposing an infant to two grammatically different languages. After testing out Halpern's hypothesis, one could also focus more on the ERP studies and conduct more research on feral children. For instance, with ERP, one could try to locate this innate knowledge within the brain that children possess. Or one could combine both ERP studies and cases of feral children and try to locate this area by comparing a feral child's brain and a non-feral child's brain. All in all, throughout this study I have found some interesting facts regarding children language acquisition and will hopefully continue to learn and discuss more about this field in the near future.

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