

Ladder Understanding of Language: How to Understand a Sentence

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Abstract

Language is expressed in a consecutive way that is called linearity; it is acceptable to think that language understanding also occurs in a linear way. In this paper, it will be argued that although sentences are expressed in a linear way, they are not understood in the same way, because we develop an understanding of the entwined phrases forming a sentence beyond the single words. Therefore, it is argued that linearity cannot adequately explain sentence understanding. In addition, by introducing the concept of mental work that is based on “the law of less work” or our natural tendency toward less mental effort, we will try to explain sentence understanding based on the ladder model instead of the linear model.

Keywords: Language understanding; Linearity of language; Ladder model; Mental work.

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1. Introduction

Words are expressed consecutively over time. Saussure (1915: 70) calls this the second principle of semiotics and the linear nature of the signifier. Time is linear, therefore, language is linear too. That is words are inevitably expressed consecutively and on a horizontal axis. In order to understand a sentence, we need to follow the stated words in a linear way until the end of the sentence.

It seems obvious that we understand the meaning of a sentence only when we follow the expressed words one after another². Sentence understanding is linear just as sentence expression is. That is sentence understanding also occurs in a linear or consecutive way, therefore, linearity is a common feature of both language expression and language understanding.

This claim is supported by strong intuition. When we hear a sentence, we understand it only if we hear it completely. This shows that understanding a sentence similar to expressing it occurs in a linear way. Consider the following sentence as an example: “Yesterday, Sara arrived late to work.” When do we understand this sentence? The normal answer to this question is that we understand the sentence completely only when the last word, i.e. “work” has been stated. In other words, as long as the sentence has not been stated completely, we cannot gain a complete understanding of it.

The main goal of the present paper is to challenge this claim by showing that sentence understanding does not occur in a linear way. In addition to challenging this idea, we aim to introduce an alternative to linearity in explaining sentence understanding. This idea was inspired

² There are some counterexamples to this claim. For example, when hearing idioms or commonly-used phrases, we may be able to guess what is going to be said only by hearing the first several words.

by works of Behin Arbabi (2007; 2010). He focuses on how things (including language) are understood, and presents a ladder model to explain language understanding.

In the first and second sections of the present paper, we will try to challenge the idea of linearity of language understanding, and our main argument will be focused on the essential role of understanding units larger than words in language understanding. In the sections 3 and 4, a new model for explaining sentence understanding, i.e. the ladder model, will be introduced as an alternative to the linear model of sentence understanding. This model is based on the concept of “less mental effort” that will be explained in the section 5 under the title of “mental work”. Finally, some objections to the presented ideas will be discussed.

2. Linearity of language

Wittgenstein asks in *Philosophical Grammar* (1974:50): Does sentence understanding occur in a linear similar to sentence expression, and if so, is sentence understanding totally consistent with sentence expression? If the answer to this question is yes, then sentence understanding must be completely consistent with hearing sentence words, otherwise, the assumption of linearity of sentence understanding is questioned.

Linearity of sentence understanding means that we understand words in a consecutive way until the sentence is finished. If this succession is somehow disrupted, then, sentence understanding is not linear. Imagine the following sentence: “Yesterday, Sara arrived late to work.” If understanding this sentence is not totally consistent with the order of the words expressed, i.e., if “late” is not understood after “arrived” and before “to work”, it cannot be maintained that the sentence is understood in a linear way.

It is hard to imagine that words of a sentence are not understood in their order of placement in the sentence. When we move forward from one word to another in a sentence, we automatically understand each word. For example, Crispin Wright (2001: 170-213) writes: We understand a word as soon as we hear or say it; we understand it instantly. He continues (2001: 177): We know the meaning of words we hear non-inferentially, immediately, and effortlessly. We intuitively know that we understand words as soon as we encounter them.

Therefore, when we see or hear a word, we instantly understand it, and we cannot understand a next word before understanding the previous one. In other words, understanding the words of a sentence occurs in the same order as they are expressed. Therefore, we cannot claim that sentence understanding does not occur in a linear way, based on the argument that it does not occur consecutively. But, we can still show that understanding the words and phrases in a sentence is different from hearing them.

Language is linear, like a graph that has just a horizontal axis. But, sentence understanding cannot occur the same way, because, we gain an understanding of a sentence when we reach the end of it; this means that all parts of the sentence have played a role in our understanding of the whole sentence. Understandings of words and phrases of the sentence must be present in our final understanding of it. If such a description of sentence understanding is true, then, it can challenge the assumption of linearity of sentence understanding.

When it is said that language is linear, it means that words are expressed one after another, so that when a certain word is expressed, the previous one has already been expressed. We argue that although language understanding occurs consecutively, the previous words that have already been understood are present in the final understanding of the sentence. Therefore, linearity

cannot explain the understanding of the whole sentence that is gained when the sentence is completed.

3. Understanding of the whole sentence

If we can show that finally a single and complete understanding of the whole sentence is gained, then, we can go one step further and argue that language understanding is not linear. We intuitively know that when we hear a sentence, we understand the whole sentence. In addition, we react to the whole sentence not just part of it. To better understand this, imagine that you are asked to close the door, while you know that the speaker, in fact, wants you to leave the room, thus, you show a reaction consistent with this request and leave the room. In this example, none of the words of the sentence were consistent with your reaction, but, based on the context, you understood the request and left the room. Therefore, you gained an understanding of the whole message despite the fact that it was not stated completely.

In short, if we claim that language understanding is linear like language expression is, then, gaining a single understanding at the end of a sentence is in contrast with the idea of linearity. When we hear the consecutive words of a sentence, we understand each of them, and when the sentence is completed, we gain an understanding of the whole sentence. Now, at the end of the sentence, do we have an understanding of the last word or the whole sentence? We have certainly understood the words of the sentence, but it is not possible to have two different understandings at the same time, one of the whole sentence and another of its last word, because our conscious experiences are unified at a single moment. According to the theory of unity of

consciousness proposed by Bayne and Chalmers (2003), any set of conscious states of a subject at a time is necessarily unified.

Given that we are faced with a phenomenon like understanding a sentence in a single time, language understanding cannot be linear the way language expression is. In the following, we will try to show that how different parts of a sentence play a role in the understanding of the whole sentence. In fact, we aim to show that gaining an understanding of the whole sentence is due to understanding of parts of the sentence that are larger than single words. If we can show this, then, we can refute the idea of linearity of language understanding, and provide an alternative to it.

4. Ladder Understanding of Language

Consider the following sentence: “Sara has an apple.” In this sentence, the terms “Sara”, “has”, “an”, and “apple” are expressed consecutively. They are also understood in this way, i.e. they are understood one after another until an understanding of the whole sentence is gained. In the present paper, it is argued that although words are expressed consecutively, they are not understood the same way. In other words, understanding units other than the single words are formed during understanding a sentence that help us gain an understanding of the whole sentence.

We develop an understanding of the entwined phrases forming a sentence. For example, we can develop an understanding even if we hear a sentence fragment or an incomplete sentence. This understanding may be vague, but we can suppose it is present in the final understanding of the whole sentence. For example, imagine that you hear the following fragment of a sentence:

“... a long and dark road leading ...” You certainly develop an understanding of it. Now, if you hear this fragment inside a complete sentence: “It was a long and dark road leading to an old castle covered with moss”, it is reasonable to suppose that you develop an understanding of both the fragment and the complete sentence or each individual word. Because when a sentence fragment is understood, this understanding is also present in the understanding of the whole sentence.

In fact, it was not your intention to hear or understand an incomplete sentence, but the sentence is suddenly cut off. If you look at your understanding, you can see that you have gained an understanding of the whole fragment not just of the last word. In other words, you understood the whole phrase “a long and dark road leading” as soon as you heard it, without focusing on individual words; this shows that larger understanding units were formed within the sentence.

When we hear a sentence, it is not the case that words are understood one after another. If this were the case, how could a single understanding of the whole sentence be developed upon hearing the last word³? In other words, at a single moment, we can either have an understanding of the last word of a sentence or of the whole sentence. Based on intuition, when we hear a sentence, we develop an understanding of the whole sentence not just the last word.

Sentence parts are involved in understanding the whole sentence. But we should distinguish between sentence expression and sentence understanding. A sentence is expressed in a progressive way, so that when the last word is expressed, the whole sentence is not present anymore, but the listener has developed an understanding of the whole sentence; this shows that the linearity found in sentence expression is not found in sentence understanding, because then it

³ Given the fact that we can only have a single and unified consciousness at any single moment.

would impossible to have an understanding of the whole sentence at the end of it. In other words, we develop an immediate understanding of the whole sentence we have heard while the expressed words are not present anymore.

For example, we finally gain an understanding of the following sentence: “Last night my heavy antique table was stolen.” According to the principle of linear expression of words, “night” is stated before “my”. But from the understanding point of view, "night" is not placed next to “my”. There is, first, the understanding of "last night", and then, this understanding will attach to "my heavy antique table". If we do not acknowledge that such a concept is formed in addition to smaller understanding units, we cannot explain how an understanding of the whole sentence is developed. Because after hearing the verb “was stolen” at the end of the sentence, how can we have an understanding the whole words we heard so far. We can have this final understanding only if an understanding of the previous fragment, i.e. “my heavy antique table” has been formed, and if this understanding along with the understanding of “was stolen” has formed a final understanding of the whole sentence⁴.

In other words, if “night” is placed next to “my”, while the phrases “last night” and “my heavy antique table” are not present, it may be argued that we can hear the last word of the sentence without having an understanding of the whole sentence in the same moment. Because in this scenario we must believe that every word of the sentence first has its own understanding and then plays a role, along with the other parts of the sentence, in understanding the whole sentence. However, we intuitively know this is not true.

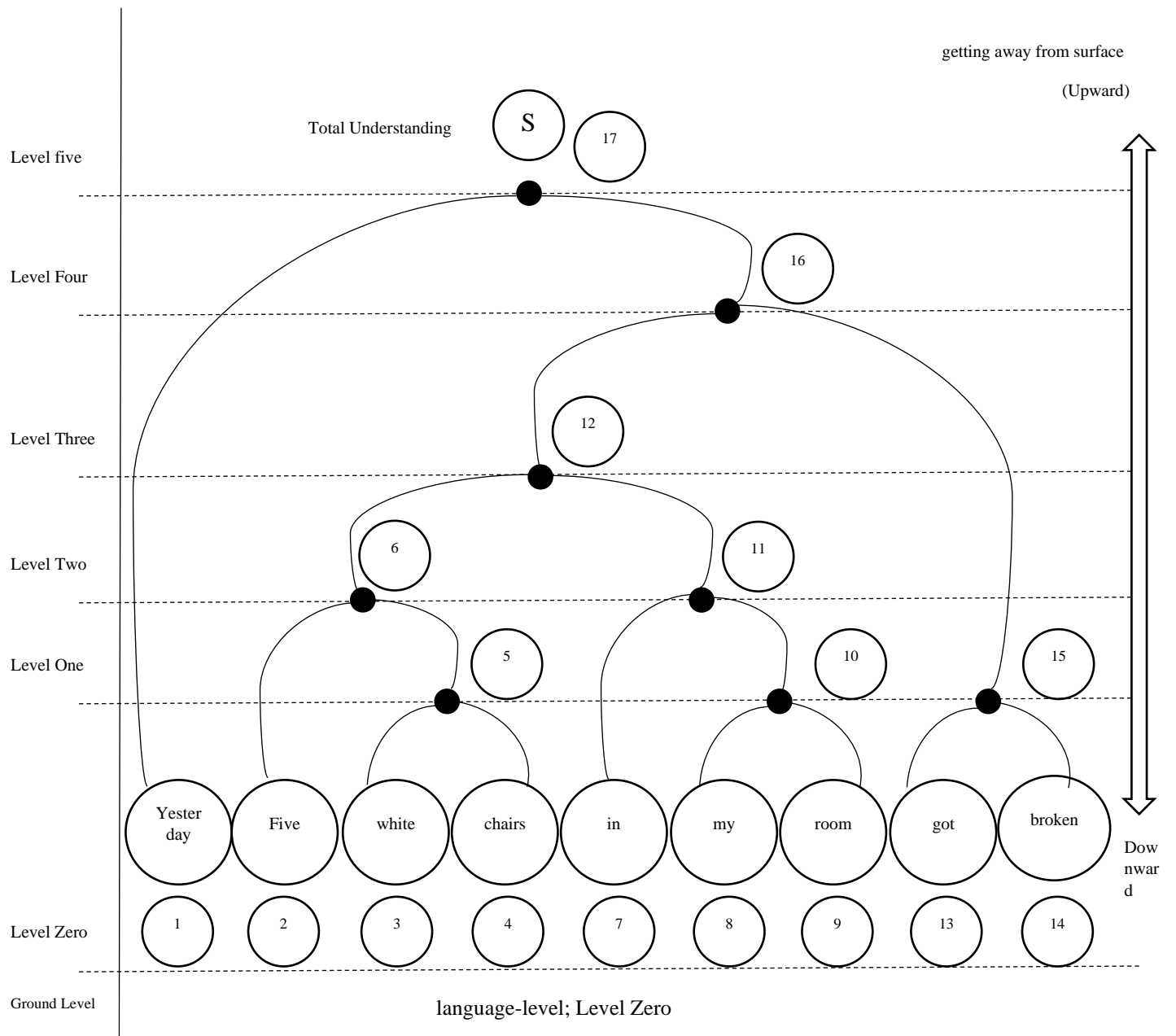
⁴ It is like musical notation or obtaining the final result of a complex mathematical formula. For example, the final result of the following formula, as a complex mathematical formula consisted of larger units, is equal to S:

$$(((x+y)*z)/(x^2*(y+z)))/6=S$$

If we suppose that fragments inside a sentence are understood in addition to single words, we can explain the role of a word like “heavy” in the final understanding of the above sentence. This word plays a role in the new understanding of “heavy, antique table”. The understanding of “heavy, antique table” is separate from the understandings of “table”, “antique”, and “heavy” together. In fact, we are faced with a third and new understanding, and it is for the formation of this understanding unit that we can explain the role of sentence parts in the final understanding of the whole sentence.

In addition, not only to the third understanding of two- or three-word fragments, but other entwined understandings are formed in the final understanding of a sentence. For example, consider the following sentence: “Yesterday, five white chairs in my room got broken⁵.” We can finally develop an understanding of this sentence. The entwined understandings that are formed to gain the final understanding of this sentence are presented in the following graph:

⁵ The graph was adopted from “Multiply of Understandings” (Arbabi, 2010: 408).



As shown in the graph above, in addition to individual words, other understanding units are formed during understanding a sentence. In this example, understanding units of 5, 6, 10, 11, 12, 15 and 16 contribute to understanding of the whole sentence. In fact, when we talk about the role of entwined understanding units in gaining a final understanding of a sentence, we refer to understanding units at different levels that are shown in the graph above.

Therefore, similar to expressing a sentence, understanding a sentence occurs over time, and in contrast to language expression that only occurs directly, language understanding occurs on a ladder due to formation of entwined understanding units. In other words, language is expressed over time, but language understanding has a vertical axis as well as a horizontal (temporal) axis; this vertical axis has a vital role in explaining how a single final understanding of the whole sentence is gained. This also shows why it is called the ladder understanding of language.

4.1. Understanding levels and the vertical axis

In order to show how and on what basis understanding units are formed inside a sentence, we will try to simulate the opposite process of gaining a final understanding of a sentence. Imagine that you have a final understanding of the sentence S , and you want to divide it into smaller understanding units in order to gain primary understandings. In other words, you want to break down the single final understanding to find the constituent understanding units. Imagine that you are the speaker of the sentence. Surely, the speaker of a sentence has an elementary understanding of it. This elementary understanding is similar to the single, final understanding that will be gained by someone who will hear the sentence. There are many other examples of

this, such as a physicist who has a elementary understanding of a physics idea, and divides this primary understanding to smaller understanding units to convey it to a listener⁶.

A speaker understanding of the whole sentence that she tries to express finally leads to understanding units that I call words. The primary understandings that will be finally gained are, in fact, the level-zero (or language-level) understandings, i.e. the horizontal axis of the graph presented above. The main reason that we consider words as primary understanding units is that we suppose that words are understanding units available at the language level that, in contrast to larger understanding units requiring a third or final understanding and greater mental work, are already available at the language level, and are effortlessly understood by the listener. In other words, we consider words the standard units of sentence understanding.

This is clearly a relative concept, and differs based on who the listener is, the type of relationship between the speaker and the listener, and the extent they are familiar with each other's languages, but, here, we suppose a standard condition. In *Philosophical Investigations* (1958: 197), Wittgenstein uses the example of mason and his assistant to show a language game. When hearing the word "slab", the mason and his assistant understand each other without any mental work. But if the mason wants to tell this single word to another person, he should break down his understanding into other words, and it would certainly make a difference whether the listener is familiar with construction terms or not. It is also a different scenario if the mason aims to explain his understanding of "slab" to a child. Therefore, we suppose that there is a level zero consisting of words ready at the language level that do not require much mental work to be understood. Thus, any single word should not be regarded as an understanding unit ready at the

⁶ To better understand this division-based idea, see: Arabai (2010: 382-407).

language level. In other words, here, we suppose that the level zero is consisted of words we already know. Therefore, we suppose that standard words are final understanding units.

These words are easily accessible, and can be understood with minimal effort. For example, if we had “FWC” instead of “five white chairs” at the primary level of language, we could just say “Yesterday, FWC in my room got broken.” However, because “FWC” is not available at the language level, we need to use a sentence that requires a higher level of mental work to be understood. The term “slab” has the same function for the mason and his assistant. Not available to other users of the language,⁷ this term has been created by the mason and his assistant, and they can understand it with less mental work.

In fact, in breaking understandings into smaller parts, the goal is to reach to a point where third and entwined understandings are formed with minimal mental work. The same way, in the higher levels of the graph presented above, new units are formed that can be understood with less mental work. The basic constituent units are understanding units that are understood with the least mental work, because they are at the language level. According to this logic, higher understanding units are those formed with less mental work. The criterion of less mental work depends on different factors, including context of conversation, one’s level of familiarity with what is expressed at the language level, familiar grammar etc. All these factors are involved in the level of mental work required for the formation of larger understanding units.

4.2. Mental work in sentence understanding

In the present paper, mental work is used as a criterion to introduce the concept of “ladder understanding of language” as an alternative to the linear model. "The law of least mental

⁷ The word "slab" is available in the language, but not in the sense the mason and his assistant meant.

effortparts. This principle sentencebased on explaining sentence understanding is useful in ⁸ indicates that we tend to choose strategies that require less effort (See: Kool et al, 2010).

According to the concept of mental work, we know that different levels of mental work are required to understand the following sentences: “a green apple” and “a handsome apple”. The first sentence is more familiar and is understood more easily than the second one. Van Petten and Kutas (1990) and Smith and Halgren (1987) have shown that sentences consisted of commonly-used word combinations are understood more quickly. For example, “John saw a ‘heavy stone’” is understood more quickly than “John saw a ‘happy stone’”⁹. This can be explained by level of accessibility. The phrase “a heavy stone” is a commonly-used phrase, while “a happy stone” is not. In other words, different levels of accessibility are related to different recognition times¹⁰.

We also intuitively realize that different sentences are understood differently. For example, the phrase “table and chair” is understood differently than “table and cup”, meaning that the former is understood more easily and more quickly. Another example is “a green apple” and “a happy apple”. Both of these phrases are finally understood, but the former is more familiar and is understood more easily. As was stated above, when a phrase is understood more quickly, it requires less mental work to be understood.

⁸ The law of least mental effort states that, everything else being equal, the brain tries to minimize mental effort expenditure during task performance by avoiding decisions that require greater cognitive demand (Patzelt, et al, 2019).

⁹ According to these studies, the average recognition time for commonly-used phrases is 400 ms that is considered the standard time.

¹⁰ Other studies have shown that words that are close in meaning (e.g. doctor-nurse) are understood more quickly. For more examples, refer to Kutas & Others (1984), Bentin & Wood (1985), and Holcomb & Neville (1990; 1991).

Therefore, mental work, as understood by us, refers to a simple phenomenon. The more familiar and accessible words and phrases within a sentence are, the less mental work is required for understanding them; and the more novel and unfamiliar they are, the more mental work is required to understand them. This can be illustrated using the following examples.

Imagine that you want to prepare a food like pizza. The less available the necessary ingredients are, the more effort is required to prepare pizza. If you buy a pre-made pizza, you can simply warm it. This certainly requires less effort than making a pizza from scratch. Another example is a physics formula that is understood more easily by a physicist who is familiar with physics concepts than a person who is not. Such examples are found in different domains of daily life. We claim that this is also true in gaining a final understanding of a sentence.

As was previously pointed out, when we hear a sentence, we finally gain an understanding of the whole sentence. This final understanding is related to understanding of sentence parts. In other words, entwined understanding units formed from the combination of words and phrases contribute to the final understanding of the whole sentence. The final understanding of a sentence is gained through mental work, and the level of the required mental work depends on how familiar the words and phrases inside the sentence are. The more familiar they are, the less mental work is required to understand them.

There are different explanations for this. For example, Saussure tried to explain it by introducing the agglutination factor. According to him, agglutination occurs when two or several language units, essentially separated from each other, are frequently used together, so that they become “an absolute unit that is hard to analyze”... when a compound word has been expressed using a very common string of meaningful units, the mind takes the shortcut, forgoes analysis,

and makes the concept completely consistent with a group of signs that are turned into a simple unit (Saussure, 1915:175-6). Steinberg (1993: 124) also writes: commonly-used phrases are kept in the memory like single words. These language units do need to be created or analyzed like new phrases. Speakers of a language consider the commonly-used phrases as a single unit when trying to express or understand them, without the need to apply grammatical rules. The more frequent a word or phrase is, the more accessible it is.

Another important factor facilitating sentence understanding is grammar. In fact, we can speak of the positive role of grammar in language understanding. For example, nouns and adjectives often come together, and we have repeatedly heard them together. Therefore, every time we see them together, we expect that they play the role they have always played. As a result of this expectation (that is not necessarily conscious), we understand phrases faster and with less mental work. For example, in the following phrases: “The room’s white chair”, “Her beautiful dress”, “The big house by the beach”, “Grandpa’s farmiloo library” ... we realize, based on our knowledge on grammar, that nouns and adjectives come together; additional larger understandings are also formed based on this knowledge. Although we have never heard of the term “farmiloo”, a third ambiguous understanding is formed of the phrase “farmiloo library”, followed by the formation of a bigger understanding of “Grandpa’s farmiloo library”; this shows that grammar simplifies language understanding based on less mental work.

Different factors can facilitate sentence understanding based on less mental work. For example Saussure refers to repeated use and role of grammar. Discussing these factors is out of the scope of the present paper, but the main point is that sentence understanding can be explained based on the concept of mental work.

We want to emphasize again that the level of mental work (that may differ based on the knowledge of the speaker and the listener, their backgrounds, the context of conversation etc.) is the main factor explaining the formation of entwined understanding units within a sentence. It is, in fact, due to the concept of less mental work that no other understanding has been formed instead of the third understanding.

5. Objections and replies

I argued that when hearing a sentence, entwined understandings are formed that each one is a single state of consciousness at a single moment. A possible objection to this argument is that we do not consciously realize these entwined understandings when hearing a sentence.

This objection is, in part, correct. We do not seem to be consciously aware of these entwined understandings. However, this does not mean that entwined understandings are not formed, but rather it shows that we are so familiar with common phrases in our languages that we do not need much mental work to understand them. In fact, the level zero of language that was shown above often includes not only words but also phrases. In other words, many phrases are understood like single words, and require minimal mental work. For example, understanding the phrase “white chairs” is like understanding a single word, because it is a very common phrase. It can be argued that when we hear the phrase “white chairs”, two understandings and a third additional understanding are not formed, but rather we develop a single understanding of “white chairs” that is in the level zero of our language. If we compare it with the phrase “honest chair”, we intuitively realize that understanding the latter requires more mental work, and that here a

third additional understanding of the whole phrase is developed that is separate from the understandings of “honest” and “Chair”.

In addition, the less mental work needed to gain a language understanding, the closer we are to the language level. For example, the phrase “naughty boy” is consisted of two words that are placed together in a straight line, but because it is a commonly-used phrase, it is not the case that first “naughty” and then “boy” are understood, but rather we are faced with a single understanding of “naughty boy” that is considered a single word at the zero level of language. Therefore, “naughty” and “boy” are not understood consciously, but rather an understanding of the whole phrase, i.e. “naughty boy”, is developed. In fact, although two words are heard and it is expected that two understandings are formed followed by a third understanding of their combination, from the semantic aspect, we are faced with a single understanding of “naughty boy”, and other understandings do not exist. This again shows that understanding a phrase is not the same as expressing it.

Here we can talk about the relativity of understanding words at the language level. When we are familiar with a phrase and have encountered it numerous times, we need less mental work to understand it, the zero level of language begins from higher levels, and fewer entwined phrases are formed. But, when we are not familiar with a phrase and the constituent words, or when a phrase has a disorganized structure, more entwined understandings are formed.

In addition, sometimes we are not consciously aware of understanding a sentence. For example, we may hear the sentence “Yesterday, it rained heavily”, without consciously noticing our understanding. But, if we hear the following sentence: “Yesterday, the rainfall was heavily happy”, it is more likely that we pay attention to our understanding of this sentence as well as the

previous one. Therefore, sometimes we do not recognize our understanding of a sentence or entwined phrases within it, not because the understandings do not exist, but as a result of not paying attention to them. But, when we hear uncommon or unfamiliar words or phrases like “happy stone”, our attention is drawn to them.

Another objection may be that the model introduced here is based on a level zero or where no mental work is required to understand words or phrases, while we intuitively know that some level of mental work is required even for understanding the most frequent words and phrases.

The level zero of language introduced in the present paper does not exist in reality. Mental work is required even for understanding the most frequent words and phrases. The language level with zero mental work is a hypothesized concept, thus, what introduced here as single words or the zero level of language is for the sake of argument. Despite this negligence, our whole argument in this paper is still credible.

This last point is not inconsistent with our previous claim that the level zero of language involves phrases larger than words. Closeness of words or phrases to the level zero does not imply that their understanding is consciously recognized, but rather we consciously notice our understanding of words or phrases that are very unfamiliar or unexpected and require a high level of mental work to be understood. The minimal mental work that is always present in understanding words or phrases does not imply that the understandings are consciously recognized.

6. Conclusion

The main goal of the present paper was to show that the conventional belief that sentence understanding has a linear pattern is not always true. In other words, we tried to show that

although sentences are expressed in a linear way, they are not understood in the same way, and that sentence understanding is best explained by the conventional intuition and the ladder understanding model.

In short, when we hear a sentence, we finally gain an understanding of it, and we intuitively recognize this understanding. In addition, sentence parts are involved in the final understanding of a sentence. Therefore, we wanted to examine the role of sentence parts in the final understanding of a sentence. When we hear a sentence, we have an understanding of the whole sentence. In addition, if we hear a fragment of a sentence, we will again have an understanding of what we have heard. Given that we intuitively know that it is impossible to have several different understandings at the same time, we can either have an understanding of the whole sentence or the last word of it. In other words, we cannot have both of these understandings at the same time. This indicates that our understanding of a sentence is different from our understanding of separate sentence parts. Therefore, when we hear a sentence, other understandings are also formed that are involved in our final understanding of the sentence. In fact, if entwined understandings are not formed when a sentence is understood, the role of sentence parts in the final understanding of the whole sentence cannot be explained. The formation of entwined understandings within a sentence is explained by the ladder model that is based on less mental work.

Now, if we suppose that the formation of entwined phrases within a sentence is not best explained by the concept of mental work that was introduced here, and that explaining this matter based on the law of least mental effort is wrong or inadequate, it still remains the main claim that for understanding the whole sentence understanding its entwined phrases is necessary remains valid. If we acknowledge that when hearing a sentence, understandings other

than those of the consecutive words are formed, that is if we consider a vertical axis in the language understanding graph, the idea of linearity of language understanding is challenged. Language is expressed in a linear way, but linearity cannot adequately explain language understanding, and language understanding cannot be explained without assuming a vertical axis based on the ladder model.

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