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Critical Review of the Models of Reading Comprehension with a Focus on Situation Models

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Abstract

Research directed at unveiling the complexities of reading skill burgeoned in conjunction with the advancements in the field of psycholinguistics. Tremendous effort has been made to make sense of the complex process of the underlying multi-faceted mechanisms of inference generation during reading. In this respect, the situation models have recently gained ground. In studies focused on reading skill, situation models are of top priority, because they illuminate the interactions among different components including the process of information network activation, strategic and conscious-based inference as well as the textual and meta-textual representations in the readers' memory. This paper reviews prevalent reading models with a focus on the critical analysis of three foundational situation models including, Event-Indexing, Construction-Integration and Structure Building models of comprehension. Unlike the previous research, the orientation of this paper toward situation models is based on their use in second language reading, which is simplified in tune and comprehensive in content. Its implications are beneficial for the wide spectrum of SLA theorists, teachers and students for the reading skill purposes.

Keywords: Situation models, Event-Indexing model, Construction-Integration model

1. Introduction

In the field of applied linguistics, reading skill, once subordinated to speaking and listening, has gained momentum due to the multi-dimensional advancements in theory and practice in recent decades (Lynch & Hudson, 1991; Groundson, 1991). As the result of paradigm shift in psycholinguistics (Adams, 1990; Bernhardet, 1991; Grabe, 1988), reading is no longer treated as a passive and receptive skill. Although for a novice reader, reading may seem as a linear, predictable and clear-cut process, various reading comprehension models claiming to unravel its complexities attest to the distressingly complex nature of this phenomenon. Consequently, thus far, multitudes of models of reading skill have been proposed and conceived as the refinement of the prior ones, in terms of components and their interrelationships.

The present review is a critical analysis of the mainstream models, starting from the rather simple *top down* and *bottom up* to the complex multidimensional models of situation models. In principal, this paper has struggled to address both advantages and disadvantages of each of these models from psycholinguists perspectives.

2. Approaches to Reading Process

2.1 Top down Processing

Chronologically speaking, systematic analysis of reading comprehension started with Goodman (1967) who offered one of the most cited models of reading skill entitled as *top-down* or the *conceptually driven* processing approach. In his conceptualization, reading is a psycholinguistic guessing game since the readers' preconceptions and background knowledge largely impact the lower-level processes such as orthographic and phonological processing, as well as the word recognition skill. According to Goodman (1967), readers are not merely the neutral and passive receivers of the information from the text rather, as Davoudi (2005) asserts, their background knowledge and other interpretive skills accompanied by the cognitive and metacognitive strategies foster the speed of the lower level processing during the comprehension stage. For instance, when a linguist reads a text related to his profession, he skips many terms in the text due to his background knowledge and this does not distort his understanding from the text while for a non-professional person it is impossible to skip any part of the text due to the lack of his background knowledge. This theory which was largely endorsed by many scholars (Barnet, 1989; Carrell & Eisterhold, 1983; Eskey, 1986; Garnham, 1985, to name a few) maintained that the printed information is just a preliminary step of reading process and there is still a more central component of reading skill which is called background information. This information is formed as the propositional, meta-textual and conceptual representations in the learners' long-term memory. This approach focuses on what readers add to the comprehension process. In top-down processing, readers get the information from the text, and then contrast it with their world knowledge in order to make sense of what is written. According to this model, readers bring meaning to the text based on their experiential and interpretive prior knowledge. In the view of Goodman, reading can be deemed as a psycholinguistic guessing game, entailing diverse stages of textual processing, predicting the content, confirming the true predictions, correcting the false predictions and finally terminating these processes (understanding the

meaning of the text). For instance, while a psychologist reads a text, he initially processes the knowledge from the text which in turn activates his background knowledge. Based on the background knowledge in the form of formal or content schemata, the reader predicts the content of the texts. If this prediction is not true, he will correct it, and consequently the reading process will be terminated. Some researchers (Clarke & Silberstein, 1977; Stanovich, 1986; Garnham, 1985; Rieben & Perfitti, 1991) interrogated the fundamental assumptions of top-down processing. Studying eye movements during reading proved that even professional readers focused on most of the words printed on the text. Similarly, studies conducted on readers with notorious background knowledge but lower processing skill indicated that despite the predictions of top-down approach, their performance was not as expected. In a similar line, Grabe (2009) maintains that in top-down models, the comprehension process is neither mechanical nor linear, but actively controlled by the reader. Thus, the main mechanisms for the processing of the text are in the mind of readers. From this perspective, readers recognize letters and words only to confirm their preconceptions with reference to the meaning of the text. Accordingly, they can successfully decode a passage even if they do not know the meaning of the new words within the text.

2.2 Bottom up Approach

Another approach toward reading skill was *bottom-up* processing. The proponents of bottom-up processing (Stanovich, 1986; Garnham, 1985; Rieben & Perfitti, 1991) put emphasis on the decisive role of the lower-level recognition skills. In their view, reading is a hierarchical and step by step process, starting from the perception of single phonemes to words, clauses, sentences and then the whole piece of discourse. For the adherents of this strand of research, readers do not skip any part of the text during reading and a great portion of reading is the outcome of unconscious processes emerging from the text, not the strategic and conscious processing on the part of the reader. In essence, this approach, as Shahnazari & Dabaghi (2014) implies, is data-driven and the role of the lower level recognition skills, including orthographic, semantic, syntactic and phonological processing are crucial. For this reason, the rapid recognition skill from phonemes to full sentences is of overriding significance.

According to Barnet, 1989; Carrell & Eisterhold, 1983; Eskey, 1986; Carnham, 1985; Iran-Nejad, 1987 among many others, during *bottom-up* processing, the reader takes a step by step order to process the text and the processing of each component takes place independently; therefore, it is not feasible to make use of higher-ordered reading skills such as making inferences, consequently, the reader's back-ground knowledge plays virtually a very limited role in driving and interpreting the meaning of a text.

2.3 Interactive Model of Reading

Rumelhurt (1977) withholds that in the interactive *model* of reading comprehension, meaning is not bound to the text alone; rather, it is the outcome of co-construction of the information within the text and the readers' interpretation. In practice, information picked up by the eyes is registered visually, and then sent to the pattern synthesizer. At the same time, a wide array of information about semantic, syntactic and pragmatic concepts is drawn up from the long

term memory into the working memory (all these happen when reading a text). During this process, the reader is involved in driving the meaning of the text and making inferences through constant and simultaneous interactions between the surface structure of the text and the readers' background knowledge. Finally, they integrate the activated information from these two sources into a coherent discourse and derive the meaning of the text. This model, as Rumelhart confirms, was a refinement over the previous simplistic and linear bottom-up and top-down models in its orientation. Nevertheless, this model has not been able to propose operational justifications for the process of unconscious inference making during reading activity. In a similar line, Alderson (2000) contended that the results of his experimental study on 25 subjects could not be accounted for by the principles of the interactive model. Consequently, Alderson questioned the predictability power of this model.

2.4 Stanovichs' (1980) Interactive-Compensatory Model

One of the central advantages of this model lies in its ability to justify the difference between the skilled and unskilled readers. Stanovich (1980) model is founded upon the principle that in reading process, when readers experience problems in one dimention of processing, their skill in other dimensions can compensate for the possible flaws and deficiencies. To put it more simply, a deficit in any other parts during reading results in a heavier reliance on other knowledge sources regardless of their level in hierarchy. So top-down processing, for a reader with low word recognition, but well at the knowledge of the text topic, may compensate for this deficit. Grabe (1988) propounded that the interactive model cannot identify the complex underlying mechanisms of reading, such as the how of the interrelation between the information networks in the learners' long- term memory.

3. The Need for Situation Models of Reading Skill

Despite the aforementioned research endeavors, there was still a wide gap to be filled in explaining the multifaceted nature of reading by reading psychologists. Some psycholinguists (Kintsch, 1988, 1998; Schank & Abelson, 1977; Johnson-Laird, 1983, Mckoon & Ratcliff, 1992; Zwaan & Radvansky, 1998) introduced *situation model* as a new reading theory which is highly applicable to reveal some complexities in decoding the text. Kintsch and Van Djik (1978) claimed that the comprehension process involves more than merely constructing a mental representations of the text itself, comprehension is first and foremost the construction of mental representation of what that text is about which is called situation model. Situation model draws heavily on inference generation as a key process in language comprehension. Thus, in this new approach toward comprehension, readers make different types of inferences, namely bridging and elaborative inferences, while the latter are not based on the text but the situational representation from the text. Their conceptualization of the comprehension skill was also informed by the connectionist theories of language learning which confirmed the simultaneous and parallel processing of semantic, syntactic, phonological, conceptual and situational components during the interaction between the working memory and these activated concepts by establishing nodes and links in the readers' long term memory. The adoption of the new terms in the analysis of reading comprehension portrayed the complexity of this multifaceted process. Regarding the invaluable contribution of situation models to our

understanding from the text comprehension, the present review intends to analyze the most important models of reading and their fundamental theories. It is clear that the results of this study are of central concern for a vast array of people from learners to teachers, practitioners and curricular developers.

3.1 The Event Indexing Model

Before elaborating on the principles of Event-Indexing model, it is necessary to consider some prominent aspects of situation models which are pertinent to this concept. As mentioned in the previous section, the comprehension of a text is not bound to text-based representation. Theorists (Zwaan & Radvansky, 1998; Glenberg Meyer, & Linden, 1987; Morrow, Brower, & Greenspan, 1989) believe that the construction of a representation of what a text is about requires the construction of a situation model which is the mental representation of a text contents. While reading a text, we unconsciously build a situational imagination from that text. For instance, when we read a story about ancient Persia, we have some imaginations and conceptualizations of the events, their time and place as well as the relationship between them that form the infrastructure of comprehending the text.

Most texts are composed of multiple events. The model considers *predicate* or *verb* as the central building block of the text for connecting the propositional information and establishing coherence in the readers' memory. In the Event-Indexing model, 'learners understanding from the text is influenced by their conscious and unconscious tendency to connect events in terms of six important indexes including *protagonists*, *causality*, *goal*, *motivation*, *temporal* and *spatial relationship*. The information included in the text act as clues to the situational representation of the text in the mind of the learners. For instance, according to Event-Indexing model, when one reads the sentence "*Ali went to teacher to ask for an extension*", after reading the word 'Ali', the reader builds a mental representation of a male person, and by confronting to more linguistic cues in the text, the reader updates the situational representation of the text (has more exact imagination from the events). In the above sentence, when we continue reading, we discover that Ali is a student; so our situational representation from Ali is updated (becomes more complete). This level of conceptualization is called the *integrated level* of the situation model. The complete model is accessed while the linguistic cues are finished and the reader has comprehended the text.

Based on the above description, the main goal of this model is to broaden the scope of situation model; consequently, it is different from the other situation models including *Resonance model* and *Construction-Integration* model. According to this model, the more indexes the events in a proposition share, the higher is the possibility of storing them in the long-term memory. As a proof, in the sentence *"I went to class to see the professor*" in comparison with the sentence "*I went to class to see chairs"*, the possibility of establishing connection between two events of going to class is more with visiting the professor than seeing the chairs based on the *goal* index. It should be noted that, in this model, text-based information as well as the background knowledge and situational representation build up a highly intricate and complex relationship which become activated while they are triggered by the contents of the short-term memory. According to Zewan & Madden (2004), in the

Event-Indexing model, the events, objects, people, goals and their relationship are considered as the backbones of the text rather than words, phrases or sentences. Generally, situation models theorists believe that comprehenders are influenced by different aspects of situations which have been pointed out in the text; consequently, the structure of the text alone is not what the readers comprehend from it. To put it differently, when we imagine ourselves in a situational context, there are important indexes, consisting of time, goals, causation, protagonists, and objects and space which play a crucial role in our conceptualization from the linguistic input. To better understand the issue, we must elaborate on the indexes of time, causality, space and protagonist and their importance for understanding a text.

3.2 Time

Our conception of time as an index is based on our real life experiences. We know that events take place in a linear and chronological order. But it should be taken into account that in the world of written or the spoken discourse, this might not be the case. For example, we can say: "*Before Ali wrote the article, he changed his idea about the title".* In this sentence, the act of writing is reported first, even though it was the last of the two events that had occurred. If we construct a situation model from this sentence, this sentence should be more difficult to process than its chronological counterpart. (The same sentence but beginning with *after*). In real life, events follow each other in a linear way; however, narratives can have temporal discontinuity which means that they are not written as they are experienced or performed in the real world. Therefore, while comprehenders read the sentences that violate the concept of time continuity, their reading time decreases in comparison with the sentences that do not violate time continuity. All other things being equal, events that happen just recently are more accessible to us than events that happened while ago.

3.3 Goals and Causation

We might have experienced that in many cases, there are some unfinished works that make our mind highly engaged. According to the Event-Indexing model, these types of events or goals remain in our mind longer than the goals that have already been accomplished. For example, passing courses is currently more active in the mind of the many hard-working students than listening to music, because passing courses as a duty has not been fulfilled yet by the learners. Thus, if a protagonist (the main character) has a goal that has not been accomplished, that goal should be more accessible to the comprehender than a goal that was just one logical relationship between the events in the world. Consider the following examples:

1) When I went to university, I saw Hassan playing football.

2) When I went to university, I saw Hassan buying a ticket.

Studies indicate that the time for processing sentence 1 is longer because the reader is not able to establish causal relationship between going to university and buying ticket.

3.4 People and Objects

In every narration, there is the possibility of having one or more protagonists in the text. While one reads a text, one builds a situational representation from the protagonist in their mind. Comprehenders are also quick to make inferences about protagonists, in their attempt to construct a more complete situation model. Consider, for example, what happens after the subjects read the sentence.

As soon as he got a job, he went to see his old parents.

With respect to the above-mentioned points in the Event-Indexing model as addressed by some scholars (Zwaan, Langston, & Graesser, 1995; Sanford & Garrod, 1981), comprehenders parse clauses of text into events. During comprehension, they connect these events based on the five different situational dimensions: *time*, *space*, *causation*, *motivation*, and *protagonist*. If the event that is currently processed overlaps with the events in the working memory on a particular dimension, then a link between these events is established and stored in the long-term memory. An overlap between the sentences is determined based on whether or not the two events share an index (time, place, protagonist, cause or goal).

It should be taken into account that the more situational indexes shared between the current model and the integrated model, the easier the updating will be. It must be noted that there are three basic assumptions behind the Event-Indexing model:

1. Events are the central units of situation models.
2. Events can be linked on five dimensions.
3. Events are related or not related on a particular dimension.

It is explicit that the Event-Indexing model has made inspirational contribution to our realization of the situation model and a wide range of inferences made during reading narrative texts. Although the term ‘situational representation’ was introduced prior to Zwaan by Kintsch (1983), it expanded the scope of comprehension theories by drawing on the six concepts of (time, causation, time, protagonist, goal and motivation) to better indicate the relationship among the events in the text. Considering the *verb* as the building block for the arguments overlaps (despite Kintsch’s model) for making relationships among different events in the text, was another major contribution of this model to the field of psycholinguistics. However, one of the serious flaws of this model, according to Gernbacher (1990), is its limited focus on the metacognitive strategies as well as the retrieval-based and text-based inferences of the readers for comprehension. Therefore, Event-Indexing model is more facilitative for the analysis of narrative texts than expository texts.

4. Construction-Integration Model

Kintsch (1983, 1988) introduced this model which was an improvement over the previous models of the reading comprehension. Proponents of Construction-Integration model (Johnson-Laired, 1983; Rumelhart, 1977; Schank & Abelson, 1977; Van den Broek & Gustafson, 1999) maintained that C-I model was different from the schema-based theories in the sense that it involved the complex process of mapping the incoming information to information in the long-term memory along with using different strategies during the

comprehension. Kintsch (1983) believes that merely emphasizing the role of schemata is not sufficient to account for reading process. It is also important to identify how different sources of information are represented in the memory of learners and how the concepts propositional and situational information are interrelated and how these finally lead to the understanding of the piece of discourse. It is significant to know how the iterative process in mapping the current discourse input to the prior discourse context plays a decisive role in comprehension process. Consequently, in the updated model of Kintsch (1983), comprehension is more than the relationships between the explicitly mentioned discourse constituents. Rather, it involves generating inferences that lead to the incorporation of the relevant background knowledge into the mental representation. These constructs conveyed that deep comprehension reflects an understanding of the referenced and implied situations, rather than representing the explicit content in the text. The two key processes involved in Construction-Integration model, construction and integration, are described below.

4.1 Construction

Before elaborating on the construction stage, we need to know that the understanding of the meaning of the text is a complicated and multilayered process. Every phrase, word or sentence the readers process from the text, activates different nodes and links in their long term memory. The nodes include propositions, concepts, words and their meanings. The contents of the short memory activate this complex network of nodes and links. For each cycle of input during construction, there are four potential sources of activation. These sources include the current input (sentence proposition that is being processed from the text), the previous sentence or proposition, related knowledge and potentially reinstatements from the prior text.

In other words, during the construction phase, different levels of representations including *text-based knowledge*, *background information* and *situation model* (through inferences) are activated simultaneously. In this process, the linguistic cues in the text guide the reader in forming a situation model. In the construction phase, propositions and concepts from the long term memory network are added to the text representation under construction (words, sentences). As a result of text-based and knowledge-based construction, a set of N+M elements is obtained. As Kintsch (1983) maintains, N elements from the text, including the words, phrases, units, concepts, propositions or model elements, plus knowledge propositions which have been selected from the long term memory by associative activation process, lead to the comprehension process.

4.2 Integration

During the integration phase, the constructed networks of (semantic, syntactic, propositional and situational information) are linked together based on the level of their association. Words are linked to phrases they are component of, phrase to sentences and so on (Kintsch, et. al, 1990). In order to establish connection between the propositions they are connected through argument overlap. The knowledge propositions that were activated associatively are linked to text elements through which they were selected in the first place.

In other words, for Kintsch (1983), knowledge is represented as an associative network, the nodes of which are words, concepts and propositions. *Comprehension* in the CI framework is the result of interaction between texts and the general stored knowledge and personal experience that the comprehernder brings to situation. *Integration* refers to the spreading of activation across the network until it settles. This process results in greater activation for peripheral concepts that have fewer connections to other concepts in the mental representation. Due to the limitations of the working memory, activation is spread through network and finally leaves only those few concepts and ideas that are connected to many other concepts, whereas less connected concepts lose activation. To put it more simply, the concepts that are associated to more concepts remain in the long term memory and the others are not adopted in the comprehension process. In the integration phase, all the activated components are linked together based on their level of association. In this stage of comprehension, text-based knowledge, background information and situational representation of the text link to one another based on their associations. That is why the principles of this model are grounded in statistical, connectionist, emergent and constraint-based theories of storing and retrieving of knowledge.

4.3 Levels of Representation

According to CI model, every sentence that is being read has three levels of representations. In the *surface structure*, each word in the text is represented by a node, and the links between these nodes indicate syntactic relations. It is important to note that the surface structure is often disregarded in the computational model because it is assumed to have limited impact on the comprehension.

One of the pioneering contributions of CI approach to the comprehension theory was the introduction of *text-based level representation* to the text processing, which is formed in terms of the propositions. Propositions consist of predicate and arguments. A proposition basically represents one complete idea. It represents the underlying meaning of the explicit information in the text, discourse or scenes. According to Kintsch (1983), readers comprehend discourse based on the complexity of the propositions, not sentences. In his studies, Kintsch indicated that the processing loads are the result of the propositional information, not the syntactic relations within a text. In this conceptualization, meaning-based analysis is preferred to the syntactically-based sentences in understanding discourse. For this purpose, Kintsch (1990) defined the notion of *atomic proposition* that includes one predicate and two arguments and arguments fill slots determined by the predicate. (e.g., *agent, object, instrument, goal*). The following example consists of predicate ‘gave’ and three arguments including an agent (I) object (article) and goal (professor).

-Sentence: I gave the article to the professor

-Propositional representation: gave (article, I, professor)

It should be noted that the explicit information regarding time and place is represented within complex propositions, which consists of several sub-propositions to a core proposition. There are many ways to represent complex sentences propositionally.

When the reader is able to find relationship between arguments (argument overlap), he can connect the two propositions and understand their meaning. If the arguments do not overlap, the reader must make inferences to fill the gap. It is worth mentioning that the overlap between predicates (verbs, modifiers) in the CI model does not result in forming relationship between them. For example, the two sentences in the examples 1 and 2 would be linked with an argument overlap (with classroom) and thus would be more cohesive, whereas the two sentences in the example 3 and 4 would be necessary to be connected with a text-based inference.

Sentence 1: Yesterday in the classroom I gave the new article to my professor

Sentence 2: Most of the other students in the class smiled.

Sentence 3; Yesterday, in the classroom I gave the new article to the professor.

Sentence 4: She gave it immediately to her friend.

Notice that in sentence 4, there are no explicit arguments that provide overlap between the sentences. This results in a potential cohesion gap because, although the verb *gave* occurs in both sentences, overlap resulting from predicates is not included in the model. Notably, that is driven solely by argument overlap and not by events or actions (Kintsch, 1983, 1990); however, based on this model, the reader would be likely to make the inference *she was the student* (based on previous sentences) and this inference would connect the two sentences. These types of textual bridging inferences and knowledge-based inferences widely contribute to the situational level of representation.

In cases where there is no text-based information, the reader makes inferences that go beyond the concepts explicitly mentioned in the text. Kintich (1983) classifies the inferences that contribute to the situational level of representation according to whether they are automatic versus controlled and also whether they are retrieved or generated. The retrieval-based inferences are extensively supported by *Resonance model* offered by a number of scholars (Albrecht & O'Brien, 1993; Myers & Obrien, 1998; Albrecht & Myers, 1995). In this model, multiple sources of information are activated and this activation is a subconscious process. For this reason, this process is called *dumb process*. According to Kintsch (1983), only those types of inferences that are not text-based, the elaborative inferences that include the information outside the text content and involve strategic and effortful processing, are included in the situational representation.

4.4 Cohesion, Coherence, Situation Model

It is tangible that coherence and cohesion of different text-types are of immense application in the theories of text processing. A coherent understanding of a text or discourse emerges to the extent that readers activate related knowledge, integrate that knowledge with the mental representation, and establish connection between propositions in discourse representation. Although in many cases these complex processes are automatically-based on the part of the reader (they do not need conscious effort), it should be noted that some texts are not textually coherent. In cases that text-based information is not helpful (i.e., cohesion gaps) for a

coherent understanding of the text, the readers are induced to activate more background knowledge and engage in effortful inferential process. In this type of inference, the situational representation of the text become helpful. If the reader can make relatively automatic connections to the prior discourse, then less prior knowledge will be activated. If gaps are encountered, then the reader will activate prior knowledge to the extent that it is available. In cases where learners have more prior information (e.g., in their special fields), this knowledge leads to multitude of connections in the nodes, consequently, the representation settles more quickly becomes more stable and results in stronger long-term memory.

Studies done by McNamara & Kintsch (1998) and McNamara (2007) indicate that there is considerable interrelationship between text cohesion and prior knowledge. According to these studies, readers with limited background knowledge benefit from greater cohesion in the text, because they lack the necessary prior knowledge to generate *bridging and elaborative inferences*. When the text lacks cohesion, inferences may improve the readers' text-based level understanding and those inferences may improve the situation model for individual sentences. The theoretical explanation for these cohesion effects are grounded in the premise that comprehension is largely determined by the coherence of the readers' situation models, and this is the function of both the cohesion of the text and the inferences generated by reader. This assumption is generally accepted by most of the computational models of comprehension.

4.5 Limitations of CI Model

Although the CI model by Kintsch (1983, 1988) was a breakthrough among the theories of text processing (Grabe, 2009; Alderson, 2000), there were numerous drawbacks within it. Firstly, the concept of argument overlapping as the only way for connecting propositions to establish coherence was put to question by some scholars (Rumelhart, 1984; Schnotz, 2002; Trabasso & Sperry, 1985). Moreover, this model is adopted to work for the analysis of expository texts and does not take into account the narratives and other genre. In addition, this model does not explain the implementation of some of the readers' goals and metacognitive process. It does not take into account the individual differences in the understanding of the text.

5. Structure Building Model

Gernbacher (1990) proposed the Structure Building model with the goal of providing a theory of comprehension regardless of medium (including pictures, films, etc.). The underlying process of the model includes general cognitive operations that function apart from the information that is common across different modalities. Thus, the focus of the model was on identifying and describing the processes that operate during the comprehension of various media such as texts and pictures.

5.1 Fundamental Assumptions

The Structure Building model defines comprehension based on three central cognitive processes: (1) laying a foundation for the mental representations of the text or discourse structure, (2) mapping information onto that foundation, and (3) shifting the new structures

when new information is not in conformity with the existing structure or it is the beginning of the new ideas. There are two mechanisms that operate to determine the strength of memory loads. *Enhancement* increases activation and *suppression* lowers activation. The following section describes the model's assumptions.

5.2 Laying the Foundations

When a reader confronts with the information in a text, he encodes the initial contents in the discourse which is of great importance for mapping the subsequent information to the foundation. To put it more simply, when the reader reads the beginning of a novel, his first conceptualizations of the topic and the possible up-coming context, act metaphorically like a foundation of a building on which other parts of it are built. Consequently, in the Structure Building model, the first stage is laying the foundations which is more resource demanding (more cognitive load) than the other process such as mapping and enhancement.

The assumption that laying a foundation occurs during comprehension is supported by three sources of evidence. First, comprehendres show slower reading times during the preliminary stages of processing a text, for example, when they read the first sentence of paragraph. (e.g., Glanzer, Fisher, and Dorfman, 1984) or the first sentence of episode. Readers also process more slowly the first sentence of the novel (Haberlandt, Berian., & Sandson, 1980). And finally Haberlandt, Berian & Sandson (1980) maintain that compreheders show an advantage for first mention where the first mentioned protagonist is more easily accessed to the second mentioned. For example, in the sentence, *Ali watched TV, and Reza went home*, the first protagonist, Ali is more quickly accessed in memory than is Reza after reading both sentences. Thus, even though Reza is more recent, Ali is more accessible in memory.

5.2.1 Mapping and Shifting

After laying the foundation, the comprehender maps the upcoming information with the aforementioned foundation (things he predicted about different aspects of the text). The possibility of effectively mapping new information to the structure is triggered by syntactic, referential, temporal, and causal relationships (Gernsbacher & Givon, 1995). Overlaping (relationship between sentences or paragraphs) can be observed in various ways, including syntactic cues (Gernbacher, 1991), concept repetition (Haviland & Clark, 1974) pronoun reference, temporal continuity and causal coherence. When comprehenders cannot map to a structure, then a sub-structure is built, which in turn necessitates laying another foundation or substructure is created, and the process resumes. The establishment of sub-structure happens when the foundation built by the reader does not match the subsequent knowledge in the text.

5.2.2 Suppression

As a substantive principle in Structure Building model, enhancement is put to work when the incoming information from the text is in some aspects pertinent to the current foundation built by the reader. Comprehension depends on the efficient construction and maintenance of mental structures, in this case, it is enhanced and incorporated into the mental structure and is then added to the foundation. Nonetheless, if the new information does not relate to the current structure, the comprehender may shift to a new mental sub-structure (building a new

foundation) or suppress new irrelevant information.

Unlike the two previously discussed models, the Structure Building model can account for the individual differences in comprehension skill. According to the model, skilled and less skilled comprehenders can be distinguished in terms of the efficiency of suppression process which determines how quickly the irrelevant meaning of ambiguous words lose activation (Gernbacher & John, 2000). For skillful readers, identifying the irrelevant information in the foundation is much easier than less skillful readers. Consequently, As Grenacher (1990) maintains, the readers endowed with more effective suppression mechanism create fewer sub-structures because they are able to inhabit the irrelevant information.

6. Conclusion

The arguments of this paper analytically illustrate that the top-down and bottom-up processing are too general and simplistic to account for the complicated nature of reading comprehension. Drawing on simple examples, we showed that through situation models, it is possible to have more profound understanding from reading skill. The Construction-Integration model was pioneer in conveying how the different levels of representation are stored in the readers' memory. This model also incorporates the notorious concepts of cohesion and coherence in reading process without any recourse to the Chomskyan and behaviorists' accounts of language nature. The adoption of connectionist theory of learning for explaining the construction of text-based knowledge, background knowledge and situational representation along with their integration was very helpful in this regard. The model also sheds light on the two types of text-based and knowledge–based inferences and shows how the bridging and elaborative inferences play major role in filling the cohesion and coherence gaps in the text. It was also shown that Event-Indexing model is helpful in presenting a plausible explanation for the situational representation of a narrative text. This model, by drawing on the five indexes of time, causality, space, protagonist, motivation, presented a coherent model of situational representation for the first time. In a similar strand, Structure Building model is helpful in indicating how individual differences are mirrored in the suppression stage of the irrelevant information in story comprehension. It goes without saying that if teachers are familiarized with the aforementioned models, the quality of their reading instruction will outstandingly improve and lead to the more reading-oriented accomplishments on the part of the learners.

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