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# Top-Down Vs Bottom-Up Processing of Knowledge in Foreign Language Learning

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**Abstract:** This study expands on one of the most-discussed, yet not fully explored areas in reading and listening comprehension of English as a second and/or foreign language learners. Two approaches in this process are explained academically through the analysis of several sources by linguists and scholars. Furthermore, during the research, it was identified that the personal attributes of the learners also play a role in the preference of the two approaches in their input of the target language. The collected literature review summarizes the differences between top-down and bottom-up approaches.

**Keywords:** top-down approach, bottom-up approach, foreign language acquisition, knowledge-driven, data-driven, decoding, input processing, personal learner attributes.

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## Introduction

It is an undeniable fact that input is an important process in acquisition of the target language. In this process two models – top-down and bottom-up – have been claimed to be applied. Preliminary researches of bottom-up processing found that reading process happens in serial style, from letter to meaning. Whereas top-down rests on the background knowledge of the reader/listener. Investigations in reading and listening comprehension have examined the processing skills exploited by skilled and less-skilled readers/listeners. Some researchers have observed that skilled readers/listeners are the learners who are better capable of engaging in top-down processing whilst others maintain that they are better able to engage in bottom-up processing. The aim of this literature review is to glance over the written academic articles and books related to these processes.

Top-down and bottom-up approaches have been a topic of interest in the research world for many years. Differentiating these two approaches in order to identify which one produces better results has led many researchers to originate controversy ideas. This study investigates ten sources on this topic. There are a number of factors that induce top-down and bottom-up approaches. For instance, background knowledge, personality, field-dependency, analytical skills, linguistic knowledge and suchlike. According to John Field (1999), the origin of these terms goes back to cognitive psychology and computer science, where processes are classified into knowledge-driven and data-driven. Bottom-up learners get comprehension of the meaning step by step combining the linguistic units such as phoneme/morphemes into syllables, then words, from words to clauses and statements. Oppositely, in top-down approach, meaning is conceived through “top”, where context plays a major role. This review seeks to address different viewpoints on this topic.

### Top-down and bottom-up models in listening

The concept of top-down and bottom-up processing has prodded much debate in language learning. The foremost attention is paid on the definition of these terms. While defined top-

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down approach as “knowledge-driven”, where context plays an important role, and bottom-up as “data-driven”, where perceptual information influences, the most critical view is remarked by Stanovich (1980) who stated that top-down processing is not always synonym to “contextual” as the learner’s broad/extensive knowledge induces narrow/intensive cognition.

The top-down approach proceeds from the general information to the specific one, and the bottom-up approach starts at the specific and progresses to the general. These are possible approaches for not only language learning, but also a wide range of fields, such as analytics, programming, nanotechnology and psychology. In order for learners to comprehend the auditory academic discourse, the various sorts of information are used through top-down and bottom-up handling in a perplexing association that the audience members use to make a psychological portrayal of the input (Park 2004; Vandergrift 2004). In bottom-up listening, the listener decodes phonemes and sounds to understand each word of the speaker. Experiential knowledge helps the listener to make a comprehension depending on what they hear (Long, 1990).

There are various variables that can influence the capacity of language learners to effectively go through bottom-up processing. These incorporate experience with the accent of the speaker, the clearness of articulation, the presence of uncertainty, the degree to which reduced forms are utilized, the speech pace of the speaker, and the length of the listening occasion (Buck 2001; Jordan 1997; Lynch 2011). Since the capacity to perceive singular words and conventional successions and review their implications is critical to the usage of bottom-up measures in aural writings, the vocabulary extension of the audience is another factor that has been appeared to influence bottom-up processing, and thusly listening understanding (Buck 2001). Exploration has demonstrated a relationship between perception, L2s' jargon size, and the level of words that are known in an aural book (Bonk 2000; Milton et al. 2010; Stæhr 2009; van Zeeland and Schmitt 2013).

Through top-down cycles, as Lynch (2006) states, language learners utilize what they definitely know to contextualize as well as to comprehend what they hear. The problem is that lower capability L2 audience members need assistance with both of the input processing approaches. Less capable audience members are more fragile in bottom-up processing and need more relevant help beforehand to compensate for a need of programmed linguistic decoding abilities (Lynch 2006; Tsui and Fullilove 1998). They have to figure out how to decrease their dependence on earlier information, or utilizing speculating from setting systems, also, increment their capacity to quickly and precisely unravel semantic information. Research by Deborah Lovrich (2007) reached the conclusion that during bottom-up processing, learner notices orthography and phonology. So it is stimulus-driven. Top-down is based on the learner’s experience and intentions. These two processes are interrelated to attention. First top-down occurs, then bottom-up is performed. The same order is observed in problem-solving. In the metacognitive (biology) lesson, students experimented two approaches in two groups. They responded that it produced a positive effect on students’ thinking and learning.

### **Application of input processes in reading**

According to Pádraic Frehan, three reading models exist: top-down, bottom-up and interactive processing approach. He suggested a set of exercises to apply top-down approach: prediction from titles, from within the sentence and paragraphs. His studies found that there are such cases when students use bottom-up method, they forget until they reach the end of the paragraph due to memory overload. In fact, reading consists of identification and interpretation skills. He affirmed interactive processing serves to catch full understanding of the reading material. Likewise, Stanovich’s (1980) interactive-compensatory model discussed

both lower level and higher level comprehension of reading. Becoming a quick reader is a gradual process.

In his seminal paper of 2001, Hui - lung Chia revealed that effective readers continually adopt top-down approach to predict the probable theme and then move to the bottom-up approach to check their assumption by reading details. He insisted that teachers should instruct students to start their reading by using a top down approach and later switch between the two approaches, as each type of interpretation supports the other. Three activities to improve top-down approach in reading: semantic map, questioning, previewing are suggested. Reader is considered an active participant by “contributing to the construction of meaning”. Via creating a semantic map, the learner builds a base on account of prediction and free associations. In questioning stage before working in groups learners are asked research questions in the form of a pre-reading activity so that their topic-related vocabulary is measured. The purpose of previewing is to construct basic idea about what the text is about by having a look at the title, pictures, topic sentences or subheadings.

### **Keeping the equivalence**

In the literature there are a few discoveries which recommend that logical data is conjured previously observation, helping us to foresee words; others, that it opens up during the perceptual cycle; others, that it is as it were utilized after a word has been distinguished. Goodman's tremendously cited see (1970) that effective readers surmise ahead utilizing current setting has not been definitively illustrated. Background knowledge for top-down processing can derive from three different sources: general apprehension of the speaker/writer, correlation to previous situations and recognition of the meaning that has been formed so far.

Self-evident truth in ELT raises the question: Which approach is more effective? However, here level of the readers/listeners is not fully taken into consideration. Low-level learners get fixated at words and do not obsess about assembling universal meaning owing to the lack of attention span. High-level learners have recourse on top-down information by filling the gaps of comprehension of the text (Oakhill & Garnham, 1988). Stanovich's interactive-compensatory mechanism proposes that when the quality of the written text or phonemic message is bad (for instance, dreadful handwriting or unwanted noise) and the information is unreliable, it is better to use contextual signals. “The more flawed the bottom-up information, the more we draw upon cues from top-down sources” (Field, 1999). This circumstance happens when the vocabulary is restrained. This analysis has found general acceptance by Buck (2001) who affirms sufficient apprehension is gained through utilizing both top-down and bottom-up approaches simultaneously. In general terms, both of these approaches should be used in parallel. The task is accomplished successfully only if analyzing the phonetic signals and words and uniting the overall meaning of the sentences come together.

### **Personality traits on the choice of processing approaches**

Pezhman Nourzad Haradasht (2013) stated that introvert learners prefer bottom-up approach while extravert learners use top-down approach. Tasks are given that should be done in top-down and bottom-up processing separately. For instance, scanning for bottom-up readers while paraphrasing works best with top-down readers. Study conducted on introvert and extravert students who used bottom-up and top-down approaches in different subjects proved the relation between personality and learning mode. The findings showed that bottom-up reading is more worthwhile with introvert learners. Inversely, extraverts produced high results when exploited top-down comprehension. It is connected with personality. Natalia Batova's (2013) analysis is fully justified by experience. Top-down approach suits in ESP

classes as it is viewed as realistic for particular teaching goals. So as to achieve a thorough comprehension of the material, both expectations based on background knowledge and paying attention to linguistic data is vital. Listening activities are aimed at improving understanding of not only grammatical utterances but also communicative competence.

Another recent study examined the impact of personal attributes on input processing. The main limitation of the research by Azar Hosseini Fatemi et al. (2014) is cognitive style and input process. However, the equations given in “The Effects of Top-down/Bottom-up Processing and Field-dependent/Field-independent Cognitive Style on Iranian EFL Learners’ Reading Comprehension” are reliable. The researcher verified that cognitive style (field dependency) plays a role in achieving good results by top-down or bottom-up approach. During the research, field-independent learners surpassed the field-dependent readers through bottom-up mode. In both instructions, field-independent learners paid attention to details while field-dependent readers viewed the passage as a whole content. The issue of proficiency level surfaces again in individual differences. The argument by Carrell and Eisterhold (1983) was supported and continued by Škudienė (2002). It is claimed that elementary level students cannot use top-down approach because the minimum amount of vocabulary extent is 5000 words in the target language. On the other hand, bottom-up processing takes much time for advanced learners for the reason that they are able to decipher illustrative input easily.

### Conclusion

The advances in input processing are achieved via learners’ close understanding and effective usage of techniques while listening and reading. Nonetheless, this remains neglected in teaching regardless of being an integral constituent of language learning. The predominant focus of this literature review is to explore the written works on differences between top-down and bottom-up processing. The tendency of utilizing whether top-down or bottom-up approach depends upon attention span, problem-solving, analytical skills and personal characteristics. Top-down processing suits learners of different ages who has sufficiently broad vocabulary while bottom-up approach is recommended to students who understand better when they pay attention to clues such as a phoneme/letter, punctuation mark or semantic signals. Top-down language users possess ability of associating their knowledge of concepts (termed as schema) as well as imagery to the provided words and phrases in the text. From the studied literature it can be inferred that bottom-up reasoning is applied by slower readers/weaker listeners. Contrarily, students who ignore details and common words in the spoken/written discourse are inclined to adopt top-down approach. As the above-mentioned input methods are regarded metacognitive skills, further research should be conducted to determine productive tasks that makes these approaches plain to carry out in class. In my own view, I believe this topic will be more perceptible if supplementary researches identify personality factors in terms of approach choice. Furthermore, teachers are required to organize various improving activities that assist learners become more effective readers and listeners.

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