The Differences between Emergentism & Skill Acquisition Theory

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Abstract

Although both emergentism and skill acquisition theory developed in the same field (cognitive theories) and as an attempt to replace Universal grammar-based approaches, there are some differences between these two theories. The differences lie under their different models of knowledge representation and their diverse degree of emphasis on the role of input. In addition, skill acquisition considers the process of learning while emergentism considers input and output, and what goes on in between has not been considered. Finally it should be mentioned that these two theories take different views towards the learning process.

Keywords: emergentism, skill acquisition, cognitive theories.

1. Introduction

Second language acquisition (SLA) is an interesting field of study and many theories exist to explain the nature of this phenomenon. One of these theories is the cognitive theory. Mitchell& Myles (2004) state that cognitive theories could be divided into two main groups in this field of study: processing approaches and emergentist approaches. Processing approaches focus on the process of learning and they do not try to explain the nature of knowledge in details (Robinson, 2001). However, the emergentist approaches do not think that the separation between knowledge and the process of learning is necessary since general cognitive principles could explain the feature of language knowledge and how it is processed. Emergentist approaches consider competence and performance as being the same and in fact no distinction between these two has been made. In this theory, "the learner is seen as operating a complex processing system that deals with linguistic information in similar ways to other kinds of information" (Mitchell& Myles, 2004, p.120). Therefore, this article tries to shed light on the differences between the skill acquisition theory as a processing approach and the emergentist one. But first it tries to make the definition of *emergentism* clear. Which type of emergentism was considered in this paper?

Emergentism is based on "a general approach to cognition that stresses the interaction between organism and environment and that denies the existence of pre-determined, domain specific faculties or capacities" (Gregg, 2003, p.43). In language acquisition, emergentists state "that simple learning mechanisms are sufficient to bring about the emergence of complex language representations "(p.45). In general, emergentism identifies language as a dynamic system whose interacting features could not be reduced to the combination of their components. However, there are two types of *emergentism* (Robinson, 2001).

2. Emergentist approaches to language acquisition

There are two types of *emergentism* based on the governing strategy that was adopted (Gregg, 2003). On type is based on input. Therefore, it is called input-based emergentism (emergentist-connectionist model). The other one considers the role of the processing working memory; however, it does not ignore the contribution of the input to the process of language acquisition. On the other hand, it emphasizes on the frequency of occurrence.

In this paper, there was an attempt to differentiate the skill acquisition theory from the emergentism-connectionism model (its strong version).

2.1. What is the emergentist-connectionist model?

This is a theory in the field of cognitive science and its root could also be traced back to neo-behaviorism. The connectionist model tries to elaborate cognition by considering neural networks and their connections. In fact, this view provides a computer system to offer a cognitive modeling. As Medler (1998) states "Unlike classical systems which use explicit, often logical, rules arranged in an hierarchy to manipulate symbols in a serial manner, however, connectionist systems rely on parallel processing of sub-symbols, using statistical properties instead of logical rules to transform information"(p.62)

In this view, mind is composed of different neurons which are classified into different groups with different functions. The first group is called input units which receive the information. The second group is called output units which display the information, and the third group refers to the units between input and output units which is called hidden (processing) units. Each unit has an activation level and the units are connected to each other. Each connection has its own weight which describes the strength of the connection. Here is a simple illustration of a simple neural net:
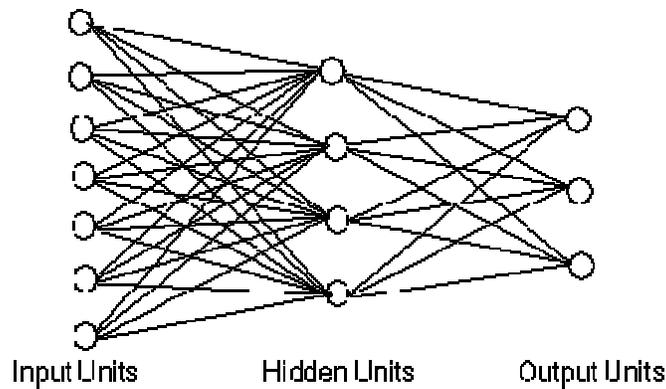

Figure1.The representation of neural network in connectionism (Garson, 2015, p.2)

Therefore, connectionism tries to explain the underlying learning mechanism in the process of language learning based on the connections and activation level. However, skill acquisition focuses on the underlying knowledge which makes possible the mastery of skill.

3. What is the skill acquisition model?

Skill acquisition is a theory in the field of cognitive science. It believes that learning a language is quite similar to learning other skills such as driving a car or playing the piano. This theory mentions that language leaning involves different stages of the cognitive process. As Segalowitz (2003) maintains one existing approach to SLA, it spots it as a particular form of complex skill acquisition. This theory believes that language learning (like other skills) starts with conscious attention, controlled processing and effort, but through practice it will lead to automaticity (Schneider& Shiffrin, 1997). For example, when a person wants to learn how to drive a car, he/she needs to pay attention to different points while driving a car; however, that person through practice could automatically drive a car with less attention. In skill acquisition theory, there is a movement from declarative to procedural knowledge. Indeed, this theory explains the underlying knowledge which is required to perform a specific skill and the productive skills are the representation of the system which has been internalized (Littlewood, 2004).

Meanwhile, skill acquisition is a theory rooted in cognitive science and neo-behaviorism and even connectionism (Dekeyser & Criado, 2013) .However, some may be interested in the differences which make skill acquisition and connectionism different. Since a clear cut distinction

between these two is not an easy task, the author tries to draw on different scholars' view towards the differences by elaborating on the theory, role of knowledge and significance of input.

4. Skill acquisition vs. Emergentism

Considering the underlying assumptions, these two theories fall within different cognitive theories. Skill acquisition is considered as a psycholinguistic model. Psycholinguistic analyses suggest that language is similar to other cognitive processes. Psycholinguistics shows that language skill is the result of earlier language use and it is affected by the learner's practice and experience with the language and the world. Anderson (1982 as cited in Robinson & Ellis, 2008) showed that "this function applies to a wide range of skills including cigar rolling, syllogistic reasoning, book writing, industrial production, reading inverted text and lexical decision" (p.251). On the other hand, emergentism draws both on social-interactionist and nativist theories by focusing mainly both on the role of input and innate mechanisms in the process of language learning. Children are born with neurons and brain which make them able to acquire language (Hollich, Hirsh-Pasek, & Golinkoff, 2000).

Hulstijn (2002) draws on another distinction, elaborating on different models of knowledge. Symbolic models such as skill acquisition and Emergentist connectionist models are different on how they represent knowledge. Symbolic models signify knowledge in terms of symbols and rules that establish the relation between these symbols. Skill acquisition as a symbolic model represents the knowledge structure as it contains a component of declarative and a component of procedural organization. However, Hulstijn (2002) defined Emergentist connectionist models as "a type of architecture in which knowledge is represented not only by means of symbols but also in a distributed way, as a pattern of activation in a neural network containing hidden units" (p.121). Therefore, these two approaches are different on how they consider knowledge structure. In a similar vein, these two theories took different views towards the role of implicit knowledge. Implicit knowledge based on the skill acquisition theory results from automatized explicit knowledge which is usually done through practice (DeKeyser, 2003). On the other hand, implicit knowledge in emergentist theories would develop during "meaning-focused communication; aided, perhaps, by some focus on form" (Ellis, 1998, p.152).

The next difference between these two theories is the role of input. Emergentism is based on input. One type of this approach is based on input and it is called input-based emergentism; however, "skill acquisition is believed to be based on out-put and it is mainly concerned with language behaviors" (DeKeyser, 2003, p.320). Meanwhile, Van Patten & Williams (2007) mentions that DeKeyser's theory does not explain three main points which are as follows:

1. Exposure to input is necessary for SL;
2. A good deal of SLA happens incidentally and;
3. Learners come to know more than what they have been exposed to in the input (p.112).

Therefore, as it was mentioned, the role of input hasn't been considered in the skill acquisition theory. Finally, it could be concluded that skill acquisition does consider the process of learning and "it does not speculate on learners got from "a" to "b" point" (McLaughlin, 1987, p. 154). However, strong versions of *emergentism* models (connectionism) relate input directly to output and the process of acquisition is not taken into consideration. (VanPatten & Williams, 2007). Meanwhile, Mitchell and Myles (2004) mention that the Emergentist connectionist model considerably differs from other models as "it does not believe that the learning of rules underlies the construction of linguistic knowledge, but rather that this happens through the associative process" (p.121).

Table1: Summary of the differences between *emergentism* and the skill acquisition theory

Skill Acquisition	E*mergentism*
It is based on psycholinguistic theory.	It is based on social-interactionist and nativist theories.
Output is important.	Input is important.
Knowledge structure is based on symbolic models.	Knowledge structure is based on symbolic models and patterns of activation.
Implicit knowledge results from explicit knowledge.	Implicit knowledge results from meaning-focused communication.
The process of learning is important.	The process of learning is not important.

5. Conclusion

In general, as it was indicated, both *emergentism* and skill acquisition theory developed under the term cognitive theories as a response to UG_ based approaches and nativism. However these two belong to different approaches in cognitive psychology and there are some differences considering their underlying assumptions such as: the role of input, model of knowledge and significance attributed to the process of learning.

It could be concluded from the present study that these two theories belong to different approaches in the field of cognitive science and they study language learning from different perspectives. If we consider the role of cognition as a central factor, it could be highlighted that connectionism starts with analyzing the internal processes and relate them directly to their external manipulation (no distinction between competence and performance is made). The role of input and its activation level and strength of connections which is calculated through weight of connections have been highlighted in connectionism. Meanwhile, the role of environment is implied to be limited only to the provider of the input. However, the environment's significance and features are not discussed in details and the lens is focused on the connections and associations. On the other hand, skill acquisition focuses both on nature and nurture (Ghaemi, & Hassannejad, 2015). In fact, the observed skills are used to visualize the cognitive processes. Through analyzing performance, competence and the underlying cognitive processes are studied. Therefore, it could be said that these two theories approach cognition and its processes through opposite directions. *Emergentism* starts with input, but skill acquisition starts with skill (output).

As a result, depending on the purpose of instruction, each of these theories could be taken by practitioners. If the focus is on the developmental stages of language learning, practice and then the final output, skill acquisition theory would be beneficial to be applied in the context. However, if the focus is on the characteristics of input and input manipulation, *emergentism* would be the practical underlying theory in the context.

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