

Towards Comprehensiveness in Theory Construction in Second Language Acquisition: A Critical Look

Nima Shakouri^{1*} & Shahriar Sarvari²

¹ Roudbar Islamic Azad University, Roudbar, Iran

² Science and Research Branch, Islamic Azad University, Rasht, Iran

* Nima Shakouri, E-mail: shakouri.ni@gmail.com

Abstract

Sparse unequivocal evidence among Second Language Acquisition (SLA) scholars boosts incomprehensiveness in theory construction. Individualism in theory construction is at the expense of excluding other perspectives and adopting a particular ideology from a parent discipline without referring to other perspectives. The purpose of the present paper is to achieve comprehensiveness in theory construction through a biological look. In a sense, the current work, although valuing the nurture-based attempts in SLA, holds that the orientation towards nature-based ideology will boost compatibility among a variety of points of view. Besides, to achieve comprehensiveness in research findings, attempts should be made to provide a link between hard and soft sciences.

Keywords

biology, innateness hypothesis, nature, neuroplasticity, nurture

1. Introduction

While numerous studies in SLA have revealed that language acquisition is a complex phenomenon; however, the knowledge of how much the biology of sex contributes to normal cognitive function is pretty limited. Overall, the scant research that has been conducted on sex differences in SLA has revealed a general trend toward higher achievement for females on most tests (Ellis, 2008). Celce-Murcia (2001), also, concluded that females are faster and easier to process and communicate.

Research shows that most of the studies conducted in this regard are limited to the rate of language acquisition (e.g., Horgan, 1981; Meisel, 2009), and fewer have been carried out concerning the biological route of SLA across sexes. It seems that providing an explanatory nature-based scenario for SLA uncovers many mysteries regarding the route of language acquisition. Similarly, the biological understanding of how female and male brains function is of scientific interest because of their prominence in SLA; thereupon, “a research in this area is quite significant because of the fact that findings can be utilized by educators to understand their learners’ capabilities and inabilities” (Ashraf, Yazdi, & Kafi, 2014, p. 293).

More specifically, She (2005) asserts that determining the dominant hemisphere of individuals results

in having effective instructional practices. Khabiri and Heidari (2011), accordingly, assert “[examining] left or right brain dominance is an important issue in developing a theory of L2 acquisition” (p. 60). They declare “as the child’s brain matures, various functions become lateralized to the left or right hemisphere” (p. 60). In so doing, the available theories need to be revisited for the purpose of designing new strategies and skills for students. In other words, as Shakouri, N. and Shokouhi, M. (2015) maintain, theories in SLA “need to be corroborated. Corroboration is achieved when a theory has sustained repeated attempts at falsification” (p. 75). In fact, corroboration of an SLA theory, for instance, “gives us a reason to support it” (p. 75). Thereupon, the present paper contending that the biological investigation of SLA paves the way towards comprehensiveness in theory construction.

2. Review of the Related Literature

That SLA is a challenging task is an actually well-accepted fact. In reality, there is no consensus among scholars on the exact position of SLA in applied linguistics. As to Ellis (2008), the rationale for the existence of numerous approaches to the study of SLA is the truism that “SLA is replete with a bewildering set of terms referring to the social aspects of L2 acquisition” (p. 281). One plausible gap in the related field is probably the lack of nature-based studies which led to oppositional views (e.g., Krashen, 1981; Pienemann, 1984). It seems that theories generated in the area of nurture have less compatibility compared to those which are nature-oriented. More importantly, contemporary SLA handbooks hardly pay attention to the role of sex differences (Ellis, 1994; Gass & Mackey, 2013). Saville-Troike (2005), also, critically expresses “there is widespread belief in many western cultures that females tend to be better L2 learners, but this belief is probably primarily a social construct, based on outcomes which reflect cultural and sociopsychological constraints and influences” (p. 90). Van der Slik, van Hout and Schepens (2015), also, claim that research findings, regarding sex differences, are sparse and the results are not conclusive.

In fact, sparse unequivocal evidence among scholars boosts the notion of contradiction rather than that of completion in search for a comprehensive theory. Similarly, Ellis (1994) puts forth “most theories of SLA are neither comprehensive nor modular. Rather they tackle a particular area or adopt a particular perspective often derived from a parent discipline—cognitive psychology, social psychology, sociolinguistics, linguistics, neurolinguistics, education without reference to other perspectives” (p. 681).

The emergence of oppositional views, as to Beretta (1993), is a problem since they are in attempt to offer mutual exclusive explanations of the same facts. Nevertheless, SLA theories “are great survivors” (Ellis, 1994, p. 685). As to Ellis, they “are not usually dismissed as a result of empirical study or powerful argumentation but, instead, tend to slip slowly and gently into oblivion” (p. 685).

Until now, the story goes on; there have been successive and often contradictory views about how best to learn language. According to Swan (2009), “progress is likely to be faster if we are able to remove some of the obstacles that we have allowed to stand in our way” (p. 132). In fact, progress can be

achieved by making more intelligent use of all the resources we have at our disposal. In the study done by Swan, the writer implies that we need no so many theories in SLA, but take stock of the existing ones and integrate them into more ideologically neutral and comprehensive approaches. In fact, research, as to Griffiths (1990), has to follow the assumed methods of the hard sciences, with no room allowed for complementarity or personal preferences. Recall that most of the raised theories (e.g., Krashen's (1981) innateness hypothesis, Chomsky's (2000) universal grammar, etc.) are derived from hard sciences and lack of unequivocal evidence in SLA is the result of exclusive explanations of the same findings.

2.1 Attempts towards Rationality in Theory Construction

Without a doubt over the past decades, the study of sex differences has received considerable attention; however, most of the studies carried out in this regard have been centered upon the "isolated correlations between certain variables, namely sex and achievement, sex and speech styles or sex and cognitive abilities; therefore, no systematic attempts have been made at finding meaningful connections among all the correlations observed" (Rua, 2006, p. 100).

Thus, the lack of unequivocal evidence in SLA implies the reality that genes and environment (nature and nurture) interact in complex ways rather than in linear ways. Thus, lack of attention to the biology of a variable (i.e., nature of it) might result in sparse empirical contrasting evidence to reach conclusions which could not persuade anyone outside the researcher's mindset. Henceforth, research findings, in the field of SLA, have become self-defeating and contradictory. Farhady (1982), for instance, sticking to the nurture of SLA, found a female advantage in listening, while Boyle (1987) reported a contrasting view that Chinese male L2 learners outperformed in listening vocabulary. The emergence of such equivocal evidence, undeniably, might not provide an end but a beginning to an end that is in favor of relativism in SLA theory construction.

Usually having more choices is generally considered a good thing. However, theoretically, when people are given lots of choices, they can get bogged down and get unwilling to take into account every aspect of the issue because it just gets too complicated. Accordingly, Beretta (1993), in favor of rationalism in theory construction, argues for complementary theories. As to Beretta, they are theoretically coherent since they are operating in different domains that each provides an answer to different parts of the SLA puzzle. Along the same vein, Schumann (1993) puts forward the notion of falsification as a significant element of theory construction in SLA. As to Schumann, the notion of falsification contends that a hypothesis cannot be tested in isolation because all hypotheses are embedded in networks of auxiliary assumptions, and when a particular hypothesis is tested and the predicted result fails to occur, one cannot know whether the hypothesis is wrong or whether there is an error somewhere in the network of associated assumptions (Shokouhi, 2012). Long (1993), in the same line, asserts that the existence of a dominant theory is necessary if the field is ever to attain the state of grace known as the normal science. On the necessity of rationalist look at theory construction in SLA, Gregg (2005), also, emphasizes:

"The more, the merrier" is an irresponsible and self-defeating attitude for an

empirical discipline to take towards theory construction. Life is too short, SLA researchers too few, and the claims of rationality too strong, for us to welcome every half-baked self-styled “theory” simply because it “challenges the paradigm”. The study of second language acquisition is an empirical scientific discipline, and one of the characteristics of science is that, in the long run at least, it progresses. An attitude of “the more, the merrier” is one good way of stalling the progress (p. 124).

Nevertheless, reality is far from ideality. What relativists are willing is not what they claim. To conclude, “if knowledge is out there and impossible to be objectified and SLA is one sort of that knowledge” (Shokouhi, 2012, p. 161) why anti-rationalists “bother to do research whatsoever” (p. 161).

2.2 Lack of Solid Empirical Evidence in SLA

In a sense, a major assumption underlying a great deal of L2 acquisition research has been that “the acquisition of a language has a clear beginning and end state” (de Bot, Lowie, & Vespoor, 2007, p. 7). Krashen’s (1981) model, for instance, views language acquisition in a linear perspective that input and acquisition are in cause and effect relation (Menezes, 2013). Though Swain’s (1995) output hypothesis is not compatible with Krashen’s (1981) position, she also argues for a linear cause and effect relation; that is, practicing the language contributes to their own production.

From the early theories of language acquisition, we can consider the innateness hypothesis contending that humans are genetically predisposed to acquire and use language. Accordingly, Chomsky’s (2000) universal grammar, consistent with innateness hypothesis, claims that humans have innate knowledge of some core features common to all language. However, “no one knows exactly what the contents of universal grammar are” (Bergmann, Hall, & Ross, 2007, p. 311), although it is in vogue in the area of research in linguistics.

The debate of innateness in humans is earlier supported in the work of Lenneberg (1967) in biology. Lenneberg, comparing learned and innate behaviors, came to hold that innate behaviors are present in all normal individuals of a species, while the learned ones are not. In this regard, Lenneberg outlines characteristics of biologically controlled behaviors as follows:

1. The behavior emerges before it is necessary.
2. Its appearance is not the result of a conscious decision.
3. Its emergence is not triggered by external events.
4. Direct teaching and intensive practice have relatively little effect.
5. There is a regular sequence of milestones as the behavior develops, and these can usually be correlated with age and other aspects of development.
6. There is likely to be a critical period for the acquisition of behavior.

Debates over the innateness hypothesis range across a slew of issues, but there is a consensus among scholars that the ability to learn an L2 seems to degrade with age. In other words, according to several scholars (e.g., Johnson & Newton, 1989; Kuhl, 2004), age-related factors reduce the plasticity of the brain. In this regard, there are two contrasting views. The first perspective insists the putative existence

of a critical period for SLA (Johnson & Newport, 1989), claiming that L2 learning is constrained by maturational factors. This assumption stemmed from Lenneberg's (1967) critical period hypothesis claims that there is, indeed, an optimal period for language acquisition, ending at puberty. As to Lenneberg, there are maturational constraints on the time an L1 can be acquired. In fact, language acquisition relies on neuroplasticity. Neuroplasticity refers to the ability of the brain to structurally change in relation to input from the environment (Shaw & McEachern, 2012). In a sense, "a strong implication of this hypothesis [i.e., critical period] is that the processes involved in any language acquisition which takes place after the age of puberty will be qualitatively different from those involved in first language acquisition" (Snow & Hoefnagel-Höhle, 1978, p. 1114).

In contrast, the more controversial view attributes the age-related declines to the effects of increasing experience with a first language (Kuhl, 2004). Accordingly, Krashen (1975), reanalyzing clinical data used as evidence, came to hold that brain lateralization occurs much earlier than what Lenneberg (1967) calculated. Thereupon, as to Krashen (1975), if a critical period exists, it will not coincide with lateralization.

Both of the abovementioned perspectives are deeply stemmed in the same underlying age-related assumptions, that is, a reduction in the neural plasticity that degrades the ability to learn (Osterhout et al., 2008). However, in Krashen's (1982) input theory, only in the acquisition or subconscious way of picking up a language are the concepts of neuroplasticity applicable to the acquisition of language skills in L2 (Maher, 2013). Still, "claiming that the brain change is dynamic implicates the assumption that the plasticity of the brain is not merely determined by age-related factors" (Maftoon, Shakouri, & Nazari, 2014, p. 35). Despite the popularity of the view (i.e., age-related assumptions), there is still little direct evidence to support it (Osterhout et al., 2008).

The idea of critical hypothesis for SLA is very controversial; critics contend that there are cases of adults learning an L2 perfectly (Bergmann et al., 2007). Thus, that later exposure to L2 is worse is a myth. In effect, there are numerous factors involved in SLA including teaching methodologies, motivation, practice that play a role in a successful L2 acquisition.

Besides age, the dynamicity of brain is also contingent on L2 proficiency level (Dehaene, 1999). Based on a prevailing hypothesis (i.e., stage hypothesis) raised by Obler, Albert and Fordon (1975) which was amended later by Galloway and Krashen (1978), bilinguals are initially dependent, to a great extent, upon the right hemisphere, but with an increase in L2 proficiency, they become more left-hemisphere lateralized. As to Obler (1981), "the [right hemisphere] participation is particularly active during the early stages of learning L2" (p. 458). Indeed, as to Obler, the very participation is owing to strategies of acquisition (e.g., guessing at meanings and using formulaic utterances) which are centered at right hemisphere.

However, to other scholars (e.g., Genesee, 1982; Seliger, 1982), bilinguals show greater right hemisphere involvement in language experience. Put differently, "there may be greater right hemisphere involvement in language processing in bilinguals who acquire their L2 late relative to their

L1 and in bilinguals who learned it in informal contexts” (Genesee, 1982, p. 315).

To sum up, lack of consensus among scholars, though boosts the replicative quality of any given theory, will not lead to an explanatory framework in theory construction. Gregg (1993) puts forth that most theories in SLA “are not in fact really theories, but rather either descriptive, non-explanatory frameworks for L2 research on the one hand, or else metaphors for organizing one’s thought on the other” (p. 289). In fact, contending theories in the realm of SLA show that there is no consensus among scholars to adopt a theoretical framework. There is a movement from an ad hoc amateurish research to a much more serious enterprise of professionalism (Mack, 2010).

2.3 Attempts towards Comprehensiveness: A Biological Look

Research shows that the theories that are well supported have a biological base. Krashen’s (1981, 1982) unwillingness towards formal instruction, for instance, is inevitably stemmed in a neurobiological base that has been less paid heed to in SLA. Indeed, Krashen’s input hypothesis that holds SLA is the product of comprehensible input designed to convey messages in low anxiety situations is undeniably inspired by Lamendella (1977). Lamendella states that first language acquisition is generally based on the limbic system (i.e., seating of emotion in the brain). Along the same line, Krashen (1981) argues that SLA in a natural setting entails greater involvement on the part of the limbic system. Kopke (2007), accordingly, declares that the role of the limbic system is strengthened particularly when the L2 becomes the basis of a person’s affective life.

Bates and MacWhinney’s (1989) competition model is also impressed by Darwin’s biological competition theory (Edelman, 1987). MacWhinney’s competition model posits that the meaning of language is interpreted by comparing a number of linguistic cues within a sentence and that language is learned through the competition of basic cognitive mechanisms.

As an alternative to nativist and emergentist theories, MacWhinney’s (2008) model asserts that language learning, per se, is grounded on Darwinian processes that take place across a wide variety of chronological period scales, that is, a phylogenetic scale, an ontogenetic scale, and a synchronic processing scale. In a sense, as a classical Darwinian sense, competition model is held that in a biological world, each species is attached to a particular niche and habitat. In that niche, each member is in competition with the other species. The abilities and tendencies of competing species, of predators, and of species that serve as food sources tightly control the habitat of them (Ghaemi & Haghani, 2011). Similarly, the mental world echoes the same tight, interlocking dependency, as MacWhinney (1988) suggests.

Complexity Theory (CT) is also a common concept in the field of physics extended to biology and applied linguistics. CT is concerned with the nature and behavior of complex systems. In biology, it argues against genetic determinism that denotes that genetics alone is not sufficient to explain life’s complex outcomes. In applied linguistics, Larsen Freeman (1997), having offered a view of SLA from a complexity perspective, came to hold that language is a complex nonlinear system as are physics and biology. It is dynamic in nature because it changes overtime.

SLA acquisition occurs at the edge of chaos, the region between order and chaos. However, Larsen-Freeman (1997), using the metaphor of dropping penny, asserts that in a chaotic system no one knows which penny will lead to the development of interlanguage. In a sense, the notion of complexity in SLA, though difficult to apply it in practice (Stacey, 2001), needs to see to what extent it is appropriate to human systems. In fact, to several scholars (e.g., Stacey, 2001), CT needs to be used authentically, not as a loose metaphor. Put another way, “chaos-complexity theory cannot apply directly to human interaction but its insights to do with strange attractors and unpredictability could present a challenge at the level of metaphor” (Stacey, 2010, p. 61).

To conclude, linking soft and hard sciences has become a precious attempt in recent decades. Larsen-Freeman (2002) has endeavored to support the social view of second language acquisition through the findings of physics and biology. Still, dealing with language as a complex nonlinear system entails reevaluating the possible assumptions concerning the mechanisms operating in SLA (Long, 1990).

3. Conclusion

It appears that neurobiological and SLA research may complement each other in informing the questions of sex differences in language, both in interpreting past research and in designing new research. Thus, further study need include sex as a design factor, and research in each field should be informed by that of the other.

The implications of sex differences in SLA is inevitably a good starting point for both educators and researchers to know that robust differences appear to underlie linguistic processing in male and female learners. In a sense, in this way, we are able to better guide SLA by assessing specific cognitive skills of the learner before assigning them to a particular mode of training.

To conclude, as far as the biological trend is concerned, to have a universal consensus among researchers to adopt a theoretical perspective, it is felt a need to take not only genetic/biological trend, but also the social/behavioral trend in SLA. As teachers, we are the leaders of a classroom filled not with students but with boys and girls learning differently before our eyes. Although children are shaped by the cultural environment, SLA is definitely the result of neural responses to natural surroundings.

References

- Ashraf, H., Yazdi, M. T., & Kafi, Z. (2014). The relationship between Iranian EFL students' brain dominant and reading comprehension skill. *Procedia-Social and Behavioral Sciences*, 98, 292-296.
- Beretta, A. (1993). Perspectives on theory construction in SLA: An introduction. *Applied Linguistics*, 14(3), 221-224. <http://dx.doi.org/10.1093/applin/14.3.221>
- Bergmann, A., Hall, K., & Ross, S. (Eds.). (2007). *Language files: Materials for an introduction to language and linguistics*. Columbus: The Ohio State University Press.

- Boyle, J. P. (1987). Sex differences in listening vocabulary. *Language Learning*, 37(2), 273-284. <http://dx.doi.org/10.1111/j.1467-1770.1987.tb00568>
- Celce-Murcia, M. (2001). *Teaching English as a second or foreign language*. London: Cengage Learning Ltd.
- Chomsky, N. (2000). The minimalist inquiries. In R. Martin, D. Michaels, & J. Uriagereka (Eds.), *Essays on minimalist syntax in honor of Howard Lasnik* (pp. 89-155). Cambridge: MIT Press.
- de Bot, K., Lowie, W., & Vespoor, M. (2007). A dynamic systems theory approach to second language acquisition. *Bilingualism: Language and acquisition*, 10(1), 7-21. <http://dx.doi.org/10.1017/S1366728906002732>
- Dehaene, S. (1999). Fitting two languages into one brain. *Brain*, 122, 2207-2208. <http://dx.doi.org/10.1093/brain/122.12.2207>
- Edelman, G. (1987). *Neural Darwinism: The theory of neuronal group selection*. New York NY: Basic Books.
- Ellis, R. (1994). *The study of second language acquisition*. Oxford: Oxford University Press.
- Farhady, H. (1982). Measures of language proficiency from the learner's perspective. *TESOL Quarterly*, 16(1), 43-59.
- Galloway, L., & Krashen, S. D. (1978). *Cerebral organization in bilingualism and second language*. Paper Presented at the Second Language Research Forum, USO.
- Gass, S. M., & Mackey, A. (2013). *The Routledge handbook of second language acquisition*. New York: Routledge.
- Genesee, F. (1982). Experimental neuropsychological research on second language processing. *TESOL Quarterly*, 16, 315-321.
- Ghaemi, F., & Haghani, M. (2011). The competition model: From language processing to pedagogical implications. *Journal of language and culture*, 2(11), 194-200. <http://dx.doi.org/10.5897/JLC11.064>
- Gregg, K. R. (2005). A response to Jordan's (2004) "Explanatory Adequacy and Theories of Second Language Acquisition". *Applied Linguistics*, 26(1), 121-124. <http://dx.doi.org/10.1093/applin/amh047>
- Horgan, D. (1981). Rate of language acquisition and noun emphasis. *Journal of Psycholinguistic Research*, 10(6), 629-640.
- Johnson, J. S., & Newport, E. L. (1989). Critical period effects in second language learning: The influence of maturational state on the acquisition of English as a second language. *Cognitive Psychology*, 21, 60-99.
- Khabiri, M., & Heidari, M. (2011). The relationship among EFL learners' left/right brain dominance, autonomy, and reading comprehension of the academic and general reading modules of IELTS. *Journal of Language and Translation*, 2(1), 59-77.
- Kopke, B. (2007). *Language attrition at the crossroads of brain, mind, and society*. Retrieved from

- <http://www.hal.archives-ouvertes.fr/hal-00981119>
- Krashen, S. D. (1975). The critical period for language acquisition and its possible bases. In D. Aaronson, & R. W. Rieber (Eds.), *Developmental psycho-linguistics and communication disorders* (pp. 211-224). New York: New York Academy of Sciences.
- Krashen, S. D. (1981). *Second language acquisition and second language learning*. Oxford: Pergamon.
- Krashen, S. D. (1982). *Principles and practice in second language acquisition*. London: Pergamon.
- Kuhl, P. K. (2004). Early language acquisition: Cracking the speech code. *Nature Reviews: Neuroscience*, 5, 831-843.
- Larsen-Freeman, D. (1997). Chaos/complexity science and second language acquisition. *Applied Linguistics*, 18(2), 141-165.
- Larsen-Freeman, D. (2002). Language acquisition and language use from a chaos/complexity theory perspective. In C. Kramsch (Ed.), *Language Acquisition and socialization* (pp. 33-46). London: Continuum International Publishing Group.
- Lenneberg, E. H. (1967). *Biological foundations of language*. New York: John Wiley & Sons, Inc.
- Long, M. (1990). The least a second language acquisition theory needs to explain. *TESOL Quarterly*, 24, 649-666.
- Long, M. (1993). Assessment strategies for SLA theories. *Applied Linguistics*, 14(3), 225-249. <http://dx.doi.org/10.1093/14.3.225>
- Mack, L. (2010). The philosophical underpinnings of necessary marriage for effective educational research. *Polyglossia*, 19, 1-11.
- MacWhinney, B. (1988). Competition and teachability. In R. Schiefelbusch, & M. Rice (Eds.), *The teachability of language* (pp. 63-104). New York: Cambridge University Press.
- MacWhinney, B. (2008). A unified model. In P. Robinson, & N. C. Ellis (Eds.), *Handbook of cognitive linguistics and second language Acquisition* (pp. 341-372). NY: Routledge.
- MacWhinney, B., & Bates, E. (1989). *The crosslinguistic study of sentence Processing*. New York: Cambridge University Press.
- Maftoon, P., Shakouri, N., & Nazari, O. (2013). Neurolinguistic approach: A plausible paradigm in SLA. *Journal of Advances in Linguistics*, 2(1), 35-40.
- Maher, K. M. (2013). Neuroplasticity in the SLA classroom: Connecting brain research to language learning. In N. Sonda, & A. Krause (Eds.), *JALT2012 Conference Proceedings* (pp. 201-209). Tokyo: JALT.
- Meisel, J. (2009). Target article: Second language acquisition in early childhood. *Zeitschrift für Sprachwissenschaft*, 28, 5-34.
- Menezes, V. (2013). Second language acquisition: Reconciling theories. *Open Journal of Applied Sciences*, 3, 404-412. <http://dx.doi.org/10.4236/ojap.2013.37050>
- Obler, L. (1981). Right hemisphere participation in second language acquisition. In K. Diller (Ed.), *Individual differences and universals in language learning aptitude* (pp. 53-64). Rowley:

- Newbury House.
- Obler, L., Albert, M. L., & Gordon, H. W. (1975). *Asymmetrical cerebral dominance in bilinguals*. Paper presented at the academy of aphasia. Victoria, Canada.
- Osterhout, L., Poliakov, A., Inoue, K., McLaughlin, J., Valentine, G., Pitkanen, I., ... Hirschensohn, J. (2008). Second-language learning and changes in the brain. *Journal of Neurolinguistics*, 21, 509-521. <http://dx.doi.org/10.1016/j.jneuroling.2008.01.001>
- Pienemann, M. (1998). *Language processing and L2 development*. Amsterdam: John Benjamins.
- Rua, P. L. (2006). The sex variable in foreign language learning: An integrative approach. *Porta Linguarum*, 6, 99-114.
- Saville-Troike, M. (2006). *Introducing second language acquisition*. Cambridge: Cambridge University Press.
- Schumann, J. H. (1993). Some problems with falsification: An illustration from SLA research. *Applied Linguistics*, 14(3), 295-306. <http://dx.doi.org/10.1093/applin/14.3.295>
- Seliger, H. S. (1982). On the possible role of right hemisphere in second language acquisition. *TESOL Quarterly*, 16(3), 8-15.
- Shakouri, N., & Shokouhi, M. (2015). Theories in second language acquisition need to be corroborated. *Studies in English Language Teaching*, 3(1), 73-82.
- Shaw, C., & McEachern, J. (2012). *Toward a theory of neuroplasticity*. London: Psychology Press.
- She, H. C. (2005). Promoting students' learning of air pressure concepts: The interrelationship of learning approaches and student learning characteristics. *The Journal of Experimental Education*, 7(1), 29-51.
- Shokouhi, M. (2012). Theory construction in second language acquisition. *International Journal of Applied Linguistics and English Literature*, 1(5), 157-162.
- Snow, C. E., & Hoefnagel-Höhle, M. (1978). The critical period for language acquisition: Evidence from second language learning. *Child Development*, 49(4), 1114-1128.
- Stacey, R. D. (2001). *Complex responsive processes in organizations*. London: Routledge.
- Stacey, R. D. (2010). *Complexity and organizational reality: Uncertainty and the need to rethink management after the collapse of investment capitalism*. New York: Routledge.
- Swan, M. (2009). We do need methods. In V. Cook, & L. Wei (Eds.), *Contemporary applied linguistics* (pp. 117-136). London: Continuum.
- Swain, M. (1995). Three functions of output in second language learning. In G. Cook, & B. Seidlhofer (Eds.), *Principle and practice in applied linguistics: Studies in honor of H. G. Widdowson* (pp. 125-144). Oxford: Oxford University Press.
- van der Slik, F. W. P., van Hout, R. W. N. M., & Schepens, J. J. (2015). The gender gap in second language acquisition: Gender differences in the acquisition of Dutch among immigrants from 88 Countries with 49 mother tongues. *PLoS ONE*, 10(11). <http://dx.doi.org/10.1371/journal.pone.0142056>