

# Theoretical Problems behind Teaching English in Elementary Schools\*

Yunhwa Pak  
(ROK Air Force Academy)

**Pak, Yunhwa.** 2001. **Theoretical Problems behind Teaching English in Elementary Schools.** *Korean Journal of English Language and Linguistics* 1-3, 437-456. This paper raises a question on the theoretical background behind the English education at the elementary school level. The Critical Period Hypothesis (CPH), supporting the common belief of the earlier the better in foreign language learning, which has promoted the strong trend toward teaching English in Korean elementary schools, is analyzed to determine whether it provides a comprehensible picture to explain age-related factors and whether it is a valid hypothesis which can be applicable in an EFL situation such as Korea. This paper concludes that CPH itself is still considered as an impending hypothesis full of unresolved issues and that the present educational situation of Korean elementary schools is rather far from the environment in which the ideas of CPH could practically apply, and thus it may be desirable to find alternative theoretical backgrounds from which the educational programs can be developed and further expanded.

## 1. Introduction

At present in Korea, many teachers and researchers are exerting their full effort to develop English educational programs especially for elementary school children, and some of them have already been launched in Korean elementary schools with the full support of the Korean Ministry of Education. Informal and commercial English education markets including private

---

\*This research was supported by the Grant of the Republic of Korea Air Force Academy made in the year of 2000.

institutions and tutoring along with publishing companies, which have targeted child learners, are also flourishing.

Before other major English educational programs are continued and developed, especially on a national scale, we need to ascertain whether there is any solid theoretical background behind this kind of national zeal. The most common and basic idea behind the English education for the elementary school learners is the belief of 'the earlier the better.' This "universal folk belief shared by many linguists (Cook 2001)" and many common people who have experienced foreign/second language learning directly or indirectly, seems to be generated mainly from the so-called Critical Period Hypothesis (CPH) which was originally suggested to explain the process of first language acquisition.

Among the various properties which humans possess, the most distinctive feature which distinguishes humans from any other species is perhaps the ability to produce language to express thoughts, feelings, and wishes and to comprehend the language. We all learn one language in the first few years of our life — our mother tongue. But the capacity to acquire a language does not disappear with childhood. In fact, most people on earth know more than one language. Therefore, it is common to distinguish between first language acquisition (FLA) and second language acquisition (SLA). The differences between them are quite noticeable not just to the experts but to anybody who has any experience with SLA. For example, whereas FLA normally has a clear onset defined by biological factors, SLA may start at any age and sometimes at any point during FLA. Secondly, whereas the result of FLA is relatively uniform in the fact that it is always directly based on the child's exposure to an authentic language in everyday situation, SLA may occur in everyday interaction between speakers of the target language, or it may also be the result of explicit teaching in the classroom. Another

salient difference noticed in everyday experience is that a child first language learner normally attains full mastery while this is hardly the case especially for an adult second language (L2) learner.

In order to explain these kinds of differences in child learners and adult/adolescent learners, the theory of CPH has been borrowed and brought in to play. After Penfield and Roberts (1959) suggested the notion of CPH, Lenneberg (1967) provided theoretical support arguing that a specific period exists during which the brain is receptive to language acquisition. His argument, termed as a 'strong version' of the critical period hypothesis is that there is a neurologically based critical period, ending around the onset of puberty. If the language learning starts beyond that period, complete mastery of the target language, whether it is first or second, is hypothesized to be no longer possible. Loss of neural plasticity is suggested as the primary cause for such incomplete attainment.

Since then, a series of variations on Lenneberg's hypothesis have been provided by a vast amount of research. For example, recent research such as Walsh and Diller (1981), Scovel (1988), and Long (1990) agreed in suggesting that there is not one critical period affecting all aspects of language at the same time but many critical periods, each closing off different abilities. Long (1990) argued that earlier references to the critical period are somewhat misleading because now it is believed that there is no single critical period. Rather there are varied formulations, each of which has its own specified critical period of time for explaining the limits of language acquisition. Similarly, the present use of the term critical period is meant to encompass formulations of a weaker sensitive period as well. The latter is thought to be more gradual in offset, and to allow for more variations in end-state attainment, than the former ones. This idea of many critical periods is still very popular. Other recent

research, such as Larsen-Freeman and Long (1991) or Ellis (1994), have provided a relatively new definition of critical periods as something about relative ease or difficulty of language learning before or after some point, usually the beginning of puberty, perhaps the result of loss of brain plasticity, itself perhaps a consequence of brain lateralization, and so forth.

The questions to be asked in this paper are: (1) Is there any solid and explicit theoretical explanation for the exact nature of critical periods in SLA and more specifically for age-related factors resulting in any age effect in language acquisition which can eventually shed light on general SLA, not just several partial explanations of various parts of SLA? (2) If so, can these explanations of critical periods be true theoretical background and rationale for promoting English education at the level of the elementary school children, especially in an EFL situation such as Korea?

## **2. Causes of Age Effects**

In the acquisition of L2 competence (morphophonological and morphosyntactic knowledge) by an adult, are there effects that can be attributed specifically to the existence, in the developing human, of a critical period or periods? In an effort to answer this question and to define critical periods, many researchers have studied noticeable age differences and have explored various age-related factors in FLA and SLA.

Results from a variety of behavioral studies (Newport 1988; Johnson and Newport 1989; Mayberry and Eichen 1991; Johnson 1992) indicated that for FLA and SLA, the age of learning is the best predictive variable for 'ultimate' attainment (linguistic proficiency). 'Ultimate' here is not used to suggest 'nativelike.' Ultimate attainment is to be understood as synonymous with the end state of language acquisition regardless of the level of

'nativelikeness' at which that state may be. With various age differences, they found in their research, there were some salient age effects in language acquisition regarding the end state and structure. They also reported that particular aspects of language have been found to be more profoundly influenced by the ages of exposure to target languages, for example, the grammatical function of language. Other aspects, such as vocabulary are relatively unaffected by the age of language acquisition. In this line of research, it goes without arguing that there are critical periods for language acquisition and they coincide 'roughly' with puberty. Although the critical period for language acquisition in humans varies across individuals, and the mean age of steepest decline in language acquisition capacity is no doubt not exactly at the mean age of puberty (see Long 1990), these researchers believed that the studies on the correlation between them suggested some possible explanatory mechanisms in age-related factors.

Though the findings are selective and preliminary, these differences between the child's FLA and adult's SLA are salient enough to prove the existence of age differences, and thus seem to lead us to confirm the presence of a critical period (or critical periods) whichever formulation it may be. Then, it is a prerequisite step to explore the possible causes of these differences and the functions of age related factors in order to identify the age effects in SLA, and thus create a better picture for explaining critical periods.

Until now various research studies have been undertaken to identify the possible causes of these age differences and the functions of age related factors in order to identify the age effect in adult SLA. In this paper relatively recent studies will be analyzed to identify the recent findings in the study of age difference according to different approaches which seem to be most frequently discussed: biological determinants, accessibility,

maturation of cognitive factors, language module, and learner characteristics and learning context.

### **2.1. Biological Determinants**

The language processor is an individual's capacity to acquire and to use a language appropriately for communicative purposes. This capacity is innate and subconscious, and it changes according to the maturation of biological factors over the language learner's lifespan. A study of Johnson and Newport (1989) is a classic on critical period effects which have been interpreted as evidence for a biologically based critical period in SLA. A number of recent studies (e.g., Long 1990; Patkowski 1994; Pulvermüller and Schumann 1994) have also found the empirical evidence that an authentic pronunciation for an L2 is unattainable after a certain age is passed. In Long's (1990) summary of his finding, he concludes that "a native-like accent is impossible unless first exposure is quite early, probably before 6 in many individuals and by about age 12 in the remainder" (206).

Although these studies provide support for Scovel's claim (1988) that an authentic pronunciation of an L2 is unattainable after a certain age, these researchers have faced criticism asserting that such empirical results might be at least partially due to participant selection factors. Bongaerts (1999) argued that even though these studies address the question of age-related differences in SLA, practically none of them were specifically designed to establish whether or not it is possible for late learners to ultimately attain a native-like accent in an L2. Therefore, in order to come to conclusive findings about this issue, it seems to be imperative for ultimate attainment studies to include successful, very advanced late learners in their research designs.

Another group of researchers who have interest in biological

determinants have explored the possible roles of brain-related functions in language acquisition. Because of progressive lateralization of cerebral functions and ongoing myelination in Broca's area and throughout the cortex, the neural substrate that is required for language learning is not fully available after the closure of the critical period (Birdsong 1999). This idea was originally proposed by Penfield and Roberts (1959), and later Lenneberg (1967) further developed it by claiming that the end of the critical period was marked by the "termination of a state of organizational plasticity linked with lateralization of function" (1967). Most of Lenneberg's (1967) arguments were made to explain FLA, but he also made some comments on SLA. For adults learning an L2, he mentioned the presence of the mental 'matrix of language skills,' which was later developed to Universal Grammar (UG) by Chomsky, in order to explain the facts of partial SLA success after the closure of the critical period.

Various research studies in favor of this line of thinking have been conducted for the SLA context (e.g., Scovel 1988; Long 1990; Pulvermüller and Schumann 1994). Most of this research, however, did not confirm Lenneberg's theory and every account in terms of purely biological changes in the brain has been challenged with a number of problems. First, there is clear evidence that it is atypical but not impossible to learn a second language to perfection after puberty (see Birdsong 1992; Bongaerts 1997, 1999). Secondly, there are many biological changes in the brain during one's lifespan, but the nature and kind of changes have not been fully identified yet. Thirdly, the notion of age difference between a child learner and an adult learner overlaps in at least three areas of development: biological development, social development and cognitive development. This is the reason why most of the research which tries to explain the age effect in language acquisition have developed its

ideas under the assumption that a biological critical period does not play a crucial role which results in the noticeable differences between a child's FLA and an adult's SLA.

## 2.2. Accessibility

Some researchers on the age effect have developed their ideas under the assumption that a biological critical period does not play a crucial role but the accessibility to language, to the language faculty, or to auditory reception may play a bigger role which results in the noticeable differences between a child's FLA and an adult's SLA.

Basically, child and adult learners seem to have the same kind of access to the language to be learned—for example, its sound waves, and the accompanying information which these sound waves deliver. A closer look at the access factors, however, reveals some differences in their language learning. Children may have the same but simply more access to the target language. Klein (1996), however, argued that this is probably true but can hardly account for the age differences. He argued that phonological features are very recurrent, and after three years, the adult learners must have heard all of them 10,000 times in a normal situation. Still, he does not pick them up whereas the child does. Unlike children, adults often have additional access, for example, to the written language. But it does not seem to facilitate acquisition or cause any particular differences in structure and end state. Another kind of language form to which both children and adults have access are a simplified version of the language—'motherese' for children and 'foreigner talk' for adults. It is uncontroversial in language acquisition research that these two types of language forms do not affect the result of language acquisition. Therefore, it can be summed up that the difference in access to language itself does not seem to play a significant role in the explanation of the age effect in language



acquisition.

With the offset of the critical period, language learners are claimed to lose the access to the mental language faculty which consists of innately specified constraints on the possible forms that natural language grammars may take, that is, the so-called 'universal grammar (UG).' It is also suggested that universal grammar continues to be mentally represented but for various reasons is no longer available or accessible—or partially accessible—to language learners.

The closure of the critical period may also result in the loss of innate learning strategies presumed to be specific to the learning of language. The Fundamental Difference Hypothesis (Bley-Vroman 1989) attributes the divergent end states of early FLA and late SLA to loss of, or lack of access to, universal grammar and associated learning principles. There have been many inquiries concerning the role of universal grammar as a major language learning faculty in both the initial and end states of adult SLA (e.g., Towell and Hawkins 1994; Flynn, Martohardjono, and O'Neil 1997). One of the most popular ideas is that invariant principles of universal grammar are not lost or inaccessible in adult SLA; rather, what is problematic is the acquisition of L2 parameters: "Parameter values become progressively resistant to resetting with age, following the critical period" (Towell and Hawkins 1994:126). On the other side of the line, a number of studies have been conducted to prove that universal grammar is in principle accessible to adult L2 learners; thus, there is no critical period that affects L2 acquisition. More arguments regarding universal grammar will be discussed in a later section.

Lenneberg's strong version of the critical period hypothesis is no longer popular, but there is a kind of approach that is needed to advance our understanding of how age may affect language acquisition. The development of speech perception

appears to be a popular area which researchers explore to verify that the age effect is a consequence of the way linguistic information is organized, stored, and/or activated in the memory (Polka 1991; Jusczyk 1992; Polka and Werker 1994; Wode 1994; Fledge 1995). Wode (1994) studied the contribution of innate versus external stimulation in conjunction with age in FLA and SLA. He argued that various kinds of evidence suggested that two modes of auditory perception, categorical and continuous perception, are neither lost nor changed through an individual's lifespan; rather they become difficult to access during the later stages of life, such as in adult SLA.

To conclude, this accessibility approach, whether it takes the total-access or the zero-access position, has been widely challenged. It is natural to expect that such extreme views on access to language or language faculty such as universal grammar or to perceptual modes should become controversial. And any position in between the two extremes—partially accessible—seems to lose its explanatory power in itself.

### **2.3. Maturation of Cognitive Factors**

It is a common belief that child learners are increasingly capable of processing linguistic input as they get older because of their cognitive maturation. However, a group of researchers (Newport 1991; Elman 1993; Goldowsky and Newport 1993) claimed that cognitive immaturity, not cognitive maturity is advantageous for language learning. Newport (1991) explained that young children's short-term memory capacity allows them initially to extract only a few morphemes from the linguistic input. Working within these processing limits, children are more successful than adults. Although adults' greater available memory allows them to extract more of the input, they come to be faced with a more difficult problem of analyzing everything at once.

The 'the less mature the better' formulation of the critical

period hypothesis is apparently not confined to the domain of language acquisition. Meier (1995) argued that in child's FLA, the language acquisition capacity remains intact, but as children mature beyond the ages of four or five its function is impeded by the child's increasingly sophisticated cognitive ability. Before this, Felix (1985) argued in his Competition Model for SLA that an intact universal grammar and advanced domain-general cognition coexist in adult's SLA, and the competition between these two systems results in the victory of the latter, hence causing the lack of success in adult's SLA. The inappropriateness of certain mature cognitive mechanisms in the SLA context was also explored by Birdsong (1994) and Bley-Vroman (1989).

#### **2.4. Language Module**

The next approach to explain the child/adult difference in SLA is through the 'language module' in our cortex which changes over the lifespan. In SLA as well as in FLA, a target language is acquired step by step by the successive analysis of a sound stream and accompanying information in the communicative setting. However, it is worth asking whether all components in the mature speaker's linguistic knowledge are acquired in this way. According to the FLA researchers who have worked in the 'generative paradigm' (see Chomsky 1985), at least some of the final linguistic knowledge, conscious or subconscious, of an adult could be there at birth. Essential parts of the speaker's linguistic knowledge are innate, and the other parts must be learned by input analysis. This general idea has been worked out in some detail in the so-called 'parameter setting approach' (Weissenborn, Goodluck, and Roeper 1992). According to this approach, there are two parts of linguistic knowledge: a 'core part' which is innate but contains at birth some 'open parameters' with a limited number of options and a 'peripheral part' which must be filled by input analysis. All the first language learner—or a

foreign/second language learner—has to do is to choose one of the options, and this is done by input analysis.

Until now, the idea of the innate universal grammar and its open parameter has been popular and seemed to possess high explanatory value in FLA research. It is, however, still worthwhile to reexamine the idea in the SLA field. It is evident that this idea of a specific language module with universal grammar has its explanatory power only in those parts of linguistic knowledge which are shared by all languages. No one is born to learn a specific language. Every child possesses the capacity to acquire any language. A second/foreign language learner, however, must learn the part which distinguishes his target language from his mother tongue by input analysis. But this part includes practically every part of the language such as the entire vocabulary, and most of the morphology, syntax, and phonology. This implies that there are some universal properties included on some abstract level. But if this is the case, then it remains to be shown that these universal properties go in any way beyond the constraints of perception, motor control and cognition which are characteristic of the human mind in general. It seems that there is not enough empirical evidence to settle this issue at present. If the so-called 'innate language module' really exists, what causes the problems in its function after a certain period? It is true that there are various changes and processes occurring around puberty and its related biological evidence is abundant. So far no biological evidence for the changes in the 'language module' has been found.

From an analysis of this recent research, it can be concluded that age does seem to have some effects on SLA but their exact nature is far from clear and their causes are mostly speculative. Even though it is clear that age demonstrates itself as a change in the learner or his environment, it is still questionable which of these changes affect SLA. It was easy to predict that none of

the above four approaches would provide powerful explanatory evidence for the age differences in SLA. The age effect should be absolute and uniform—that is, the effect should be noticeable in every learner—for any age effect hypothesis to become an acquisition theory with generalizability, but most of the approaches have been exploring partial segments of SLA so far.

### **2.5. Learner Characteristics and Learning Context**

In the meantime, there is another line of recent research which can shed some light on the quest for identifying the effective acquisition of a second language acquisition, and thus to help find the secret of successful SLA among adult learners. It is the research on highly successful adult L2 learners who seem to overcome the typical limitations of adult learners. Therefore the outcome of the research can be the evidence against the presence of critical periods in SLA because they are the evident exceptions to the CPH.

For those who support the notion of a critical period for foreign language learning, it goes without arguing that it is totally exceptional to achieve a native-like fluency—such as in pronunciation or grammatical competence—in late foreign language learning after a specified, biological period of time. A number of studies, however, have found a few exceptional cases of very advanced learners (see Long 1990; Birdsong 1992; White and Genesee 1996; Bongaerts 1997, 1999) and have drawn a conclusion that the claims concerning an absolute biological barrier to the attainment of natively like fluency in a foreign language are too strong.

In a very recent effort to identify the possible causes of the age-related differences, some researchers have conducted L2 research with somewhat different research designs and identified highly successful adult learners (Fledge 1995; Bongaerts et al. 1997; Bongaerts 1999). The examples of these highly successful

learners lead them to argue that a combination of certain learner characteristics and learning contexts may work together to overcome the limitations of late L2 learners and lead them to their exceptional success. Klein (1996) suggested that a native-like accent may be attainable for late L2 learners provided that it is vitally important for them to sound like native speakers and provided they have continued access to massive, authentic L2 input. In the studies of Bongaerts (1999) and Fledge (1995), both factors were clearly operative in the case of the very successful learners. All of the subjects were highly motivated learners who self-reported that it was very important for them to be able to speak their target languages (English or French) without a foreign accent, and they all received a large amount of input from native speakers from the time they entered the university at around the age of 18.

Another important learning-context factor which was suggested by Ioup (1995) on the basis of her study is 'input enhancement through instruction,' which seemed to help her adult subjects achieve comparatively successful attainment. The study of Bongaerts et al. (1997) on the highly successful learners also supports her argument with the result that they all had received intensive perceptual training that focused their attention on subtle phonetic contrasts between the speech sounds of the target language and those of their mother tongue. She further explained that this might help them rely less on the categorical mode and more on the continuous mode of perception, as they did when they acquired their first language, and thus to gradually work out what the relevant sound cues in the L2 are (Martohardjono and Flynn 1995) and to establish correct perceptual targets (Fledge 1995) for the L2 speech sounds.

In spite of the common sense that native-like attainment in some areas like pronunciation or grammatical competence by an older learner is almost impossible, exceptionally successful adult

L2 learners have been now identified even though the number is still very small. Then, the question that needs to be asked is, what is it that makes the exceptionally successful learners identified in those experiments so different from most of the less successful learners? At present we are far from being able to get a conclusive answer to this question because a detailed study of the specific characteristics of these learners has not yet been made. To conclude, although the general population of adult L2 learners is typically less successful, it seems that at least some older L2 learners have beaten the predictions of the critical period hypothesis in some areas. What we have to do now is to identify which combination of learner characteristics, learning context and language variables is instrumental in making native-like attainment possible.

### **3. EFL Situation**

Regardless of the effort to verify the nature of critical periods, some researchers have argued that CPH may not have generalizability in an EFL situation such as Korea. So far, all the ideas developed on the basis of CPH have the assumption that L2 learners learn a target language in a natural language learning environment. That is, learners who start to acquire a target language before the critical period are hypothesized to be able to achieve natively like mastery, provided that they are continuously exposed to sufficient and authentic input from native speakers of the language. In order to secure the prerequisite conditions for CPH to work, at least the following conditions should be guaranteed. First, the type of input should be regular and systematic; access to rich input from native speakers should be easy; and its amount should be massive. Second, motivational needs are required, through which authentic communication experience should be guaranteed unlike the

artificial classroom environment which is full of preplanned curriculum; and also needs for comprehensible output should be required. Unfortunately, the present circumstances of English education in Korean elementary schools do not seem to meet any of these conditions. By the same token, all SLA studies with a research design using a classroom setting have been conducted with caution because guided and tutored acquisition in the second language classroom may result in the potential problem of generalizability of its results. This is because classroom learning does not greatly reflect normal functioning and the regularities of natural human language learning capacity, but the effect of artificial and prescheduled instruction. Therefore, it can be concluded that any idea developed from CPH, whether or not it is theoretically solid or acceptable, should not be applied in an EFL situation such as Korea until its generalizability is proven.

Some other related research has found that child learners are better at acquiring a language implicitly while adult/adolescent learners are far better at figuring out the structure of language explicitly. With this line of thought, DeKeyser (2000) argued that age effects in SLA should not be overstated. In other words, the argument that children should learn a foreign language in elementary school rather than in high school, does not seem to have enough supporting theoretical background. Moreover, a few hours of foreign language teaching per week in elementary school does not seem to be effective because the children's implicit learning requires a massive amount of input, which only total immersion can provide.

#### **4. Conclusion**

In spite of an amazing amount of research, the concept of a critical period for L2 acquisition continues to be a controversial topic. Not only is there no agreed-upon explanation but also the



very existence of the phenomenon is denied or played down by some researchers (Ioup 1995; Bongaerts et al. 1997; DeKeyser 2000). This kind of problems does not imply that CPH is not a valid hypothesis. But it may implies the CPH may not be a proper foundation from which the Korean English education can be developed. In order to secure its legitimacy, more efforts are required to determine the nature of the critical period and its function in comprehensive areas of language acquisition.

Meanwhile, the present situation of English education in Korean elementary schools does not meet some basic requirements for CPH to work. Therefore, even some plausible explanations of the age factors under the idea of CPH may not have generalizability in an EFL situation such as Korea. This fact makes us realize the urgent need to secure relevant research data to Korean EFL setting. That is, it's necessary to implement CPH studies with EFL setting under various research designs so that their research data can provide with some insights for the frame and contents of the Korean English education. This paper does not argue that the present English education at elementary school level will be ineffective or should be stopped because of the problems mentioned above. Every policy, however, especially an educational policy needs to have a rather solid theoretical background which plays a role of the root of the policy or program from which it can be developed. Therefore the quest for more relevant rationales and theoretical backgrounds for the English education programs or policies for Korean elementary school children is required before they are further developed and expanded.

### References

- Birdsong, D. 1992. Ultimate attainment in second language acquisition. *Language* 68, 706-55.
- Birdsong, D. 1994. Decision making in second language acquisition.

- Studies in Second Language Acquisition* 16, 169-82.
- Birdsong, D. 1999. Whys and why nots of the critical period of second language acquisition. In D. Birdsong, ed., *Second Language Acquisition and the Critical Period Hypothesis*, 1-22. Mahwah, NJ: Lawrence Erlbaum Associates.
- Bley-Vroman, R. 1989. What is the logical problem of foreign language learning? In S. Gass and J. Schachter, eds., *Linguistic Perspectives on Second Language Acquisition*, 41-68. Cambridge University Press.
- Bongaerts, T. 1997. Exceptional learners and ultimate attainment in second language acquisition. In J. Aarts, I. de Mønnink, and H. Wekker, eds., *Studies in English Language and Teaching*, 169-83. Amsterdam/Atlanta: Rodopi.
- Bongaerts, T. 1999. Ultimate attainment in L2 pronunciation: the case of very advanced late L2 learners. In D. Birdsong, ed., *Second Language Acquisition and the Critical Period Hypothesis*, 1-22. Mahwah, NJ: Lawrence Erlbaum Associates.
- Bongaerts, T., C. van Summeren, B. Planken, and E. Schils. 1997. Age and ultimate attainment in the pronunciation of a foreign language. *Studies in Second Language Acquisition* 19, 447-65.
- Chomsky, N. 1985. *Knowledge of Language*. New York: Prager.
- Cook, V. 2001. Linguistics and second language acquisition: one person with two languages. In M. Aronoff and J. Rees-Miller, eds., *The Handbook of Linguistics*, 488-511. Oxford, UK: Blackwell.
- DeKeyser, R. 2000. The robustness of critical period effects in second language acquisition. *Studies in Second Language Acquisition* 22, 499-533.
- Ellis, R. 1994. *The Study of Second Language Acquisition*. Oxford, England: Oxford University Press.
- Elman, J. L. 1993. Learning and development in neural networks: the importance of starting small. *Cognition* 48, 71-99.
- Felix, S. 1985. More evidence on competing cognitive systems. *Second Language Research* 1, 47-72.
- Fledge, J. E. 1995. Second language speech learning: theory, findings, and problems. In W. Strange, ed., *Speech Perception and Language Experience: Issues in Cross-Language Research*, 233-77. Timonium, MD: York Press.
- Flynn, S., G. Martohardjono, and W. O'Neil. eds. 1997. *The Generative Study of Second Language Acquisition*. Mahwah, NJ: Lawrence Erlbaum Associates.
- Goldowsky, B. N. and E. L. Newport. 1993. Modeling the effects of processing limitations on the acquisition of morphology: the less is more hypothesis. In E. Clark, ed., *The Proceedings of the 24th Annual Child Language Research Forum*, 124-38. Stanford, CA: Center for the Study of Language and Information.
- Ioup, G. 1995. Evaluating the need for input enhancement in post

- critical period language acquisition. In D. Singleton and I. Lengyel, eds., *The Age Factors in Second Language Acquisition*, 395-423. Clevedon, England: Multilingual Matters.
- Johnson, J. S. 1992. Critical period effects in second language learning: the effect of written versus auditory materials on the assessment of grammatical competence. *Language Learning* 42, 217-48.
- Johnson, J. S., and E. L. Newport. 1989. Critical period effect in second language learning: the influence of maturational state on the acquisition of English as a second language. *Cognitive Psychology* 21, 60-99.
- Jusczyk, P. W. 1992. Developing phonological categories from the speech signal. In C. A. Ferguson, L. Menn, and C. Stoel-Gammon, eds., *Phonological Development: Models, Research, Implications*, 17-64. Timonium, MD: York Press.
- Klein, W. 1996. Language acquisition at different ages. In D. Magnusson, ed., *The Lifespan Development of Individuals: A Behavioral, Neurobiological, and Psychological Perspectives: A Synthesis*, 244-64. Cambridge, England: Cambridge University Press.
- Larsen-Freeman, D. and M. H. Long. 1991. *An Introduction to Second Language Research*. London: Longman.
- Lenneberg, E. 1967. *Biological Foundations of Language*. New York: Wiley.
- Long, M. 1990. Maturational constraint on language development. *Studies in Second Language Acquisition* 12, 251-85.
- Martohardjono, G. and S. Flynn. 1995. Is there an age factor for universal grammar? In D. Singleton and I. Lengyel, eds., *The Age Factors in Second Language Acquisition*, 135-53. Clevedon: Multilingual Matters.
- Mayberry, R. I. and E. B. Eichen. 1991. The long lasting advantage of learning sign language in childhood: another look at the critical period in language acquisition. *Journal of Memory and Language* 30, 486-512.
- Meier, R. P. 1995. Review of S. Pinker, *The language instinct: how the mind creates language*. *Language* 71, 610-4.
- Newport, E. L. 1988. Constraints on learning and heir role in language acquisition: studies of the acquisition of American sign language. *Language Science* 10, 147-72.
- Newport, E. L. 1991. Contrasting conceptions of the critical period for language. In S. Carey and R. Gelman, eds., *The Epigenesis of Mind*, 111-30. Hillsdale, NJ: Lawrence Erlbaum Associates.
- Patkowski, M. 1994. The critical period hypothesis and interlanguage phonology. In M. Yavas, ed., *First and Second Language Phonology*, 205-21. San Diego, CA: Singular.
- Penfield, W. and L. Roberts. 1959. *Speech and Brain Mechanisms*. New York: Atheneum.
- Polka, L. 1991. Cross-language speech perception in adults: phonemic,

- phonetic, and acoustic contributions. *Journal of the Acoustic Society of America* 89, 2961-77.
- Polka, L. and J. F. Werker. 1994. Developmental changes in perception of non-native vowel constraints. *Journal of Experimental Psychology: Human Perception and Performance* 20, 421-35.
- Pulvermüller, F. and J. H. Schumann. 1994. Neurobiological mechanisms of language acquisition. *Language Learning* 44, 681-734.
- Scovel, T. 1988. *A Time to Speak: A Psycholinguistic Inquiry into the Critical Period of Human Speech*. Rowley, Mass.: Newbury House.
- Towell, R. and R. Hawkins. 1994. *Approaches to Second Language Acquisition*. Clevedon, England: Multilingual Matters.
- Walsh, T. and K. Diller. 1981. Neurolinguistic considerations on the optimum age for second language learning. In K. Diller, ed., *Individual Differences and Universals in Language Learning Aptitude* 3-21. Rowley, Mass.: Newbury House.
- Weissenborn, J., H. Goodluck, and T. Roper. eds. 1992. *Theoretical Issues in Language Acquisition*. Hillsdale, NJ: Lawrence Erlbaum Associates.
- White, L. and F. Genesee. 1996. How native is near-native? The issue of ultimate attainment in adult second language acquisition, *Second Language Research* 12, 233-65.
- Wode, H. 1994. Nature, nurture, and age in language acquisition: the case of speech perception. *Studies in Second Language Acquisition* 16, 235-345.

박윤화

충청북도 청원군 남일면 쌍수리 사서함 335-1호

공군사관학교 영어과

우편번호: 363-849

전화번호: 043) 290-6334

E-mail: yhpak@afa.ac.kr

접수일자: 2001. 8. 20.

게재결정: 2001. 9. 11.