

An Optimum Age for Second Language Learning

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Abstract

There is a commonly held and oft-stated belief that early second language (L2 learning) leads to better language learning and that L2 learning success decreases with age. There is a large amount of research, beliefs and opinions on this topic. This report will summarize some of the available evidence around L2 learning, past and present. This will show how the field as a whole has developed and offer how it can continue to develop into the future. Based on this data, the report will offer an opinion on the optimum age for L2 learning.

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[language input]

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List of abbreviations used in the report:

AO–Age of Onset

AOA–Age of Arrival

CPH–Critical Period Hypothesis

L1–First language

L2–Second language

LAD–Language Acquisition Device

SLA–Second Language Acquisition

SPH–Sensitive Period Hypothesis

UG–Universal Grammar

1. Introduction

There is a commonly held and oft-stated belief that early second language (L2 learning) leads to better language learning and that L2 learning success decreases with age. The available studies are often inconclusive, impossible to compare fairly, confusing, and conflicting. However, there are consistent points that appear regularly throughout the

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various language learning hypotheses and methodologies. These consistencies offer a solid insight into what could be the optimum age for L2 learning. This has implications for learners, teachers and the L2 research field.

2. Language Learning: Methods and Hypotheses

Before we deal with the question of the optimum age to learn a second language, we need to examine what learning a language actually is. It is important to distinguish between first and second language acquisition, and this is what we will look here.

2.1 The Role of Input

Language production is an integral part of acquisition. After all, the learner must actually say something. However, what is less obvious is *when* this happens, the optimum age *where* this happens and to *what* extent does acquisition equate fluency, which it often does not. What types of input are given to the learner? What input makes acquisition successful? What input registers cognitively with learners? What is the quality of this input? And if researchers have already studied different kinds of input, which they have, then why don't teachers universally use consistent input from successful studies? It is clear we need to understand the nature of language input. Researchers are generally unsure if there is direct mapping between input and output.

We should also have questions about the L2 learners. Are they adults or children? What is their cultural background? What are their motivations? What is the learner environment? What settings surround the learners? Are they natural settings, or classrooms? Most of the available empirical research has taken place in a classroom experimental setting. In sociolinguistic models, settings place different demands on the learner, and offer different learning opportunities.

2.2. First Language Acquisition: Research and Hypotheses

There are differing views on nature versus nurture in the context of first language acquisition. There are also differences on whether first language acquisition is a continuous or discontinuous process. There are yet more opinions on whether L1 acquisition is a universal process or whether it is innately set within the individual.

Universal Grammar (UG) and has been pioneered by Chomsky among others since the 1960s. Most UG research has been in first language acquisition. UG uses principles and parameters that can be set within a language. It posits that all humans have an innate Language Acquisition Device (LAD). This theory is universally applicable; it affects all humans, and does not take into account individual learners. It also doesn't take learner environment into account. Yet children certainly react to their environment in all aspects

of development, including L1 acquisition. Children often produce utterances that are grammatically correct that they have never heard or produced before. If environment is not taken into consideration, then where does this come from? This is 'the logical problem of language acquisition' or the poverty of the stimulus argument (Laurence and Margolis, 2001).

The *Piagetian, or cognitivist*, approach seeks to address Innatism's limitations. For this approach, cognitive development (including language acquisition) progresses in discrete, separate stages. There is no innate linguistic knowledge, but cognitive stages. These stages are dependent on the environment (nature). The stages may be, and probably are, discontinuous, so it is entirely possible that people can and do skip stages. Views differ whether these observations should be explained by biological scheduling or by social/psychological factors. There is some innateness assumed with cognitive linguistics, but researchers in that field also theorise that we can learn languages just like we can learn anything else.

There are some things that are universal, but some other things cannot be translated into language. Human brains think about conversations before we are even aware of it. Vygotsky's *socio-cultural* approach posits that language precedes cognitive development. This hypothesis is dependent on the environment (language input).

The social-interactionist approach is different from the socio-cultural approach in that innate (genetic) aspects of language may be necessary for language acquisition. So, we need a sort of predisposition to learn a language. It could be argued that UG fits here. However, this alone is not sufficient. Learners also need language and social interaction. So, for L1 acquisition, children must be exposed to action and language. Language abilities develop from here, and in part through practical needs for communication. The social-interactionist approach takes both nature and nurture into consideration.

It is clear that multiple factors are required for L1 acquisition. Notably, we seem to need an innate ability to learn a language. But we also need an environment conducive to acquiring the language. From this environment comes input, communication and social interaction.

2.3. Second Language Acquisition: Research and Hypotheses

Second Language Acquisition (SLA) research is formed by questions that have been asked in general linguistics. What is the definition of language? What do we know when we know a language? What is the nature of linguistic language? If we know the rules of a language, then what are the implicit and explicit rules regarding the language? There are also abstract rules going on here, but of course there is more to language than that. And also, what are the main approaches to the study of language? (Tusun, 2021)

There are conflicting hypotheses about the question of whether L2 learners have access to Universal Grammar. This affects the role of age in L2 acquisition. Learners may have

no access at all. So, learners may not use UG, but more direct methods of acquiring the language. It has already been hypothesized that adults use other problem-solving abilities to acquire a language later in life, compared to a child acquiring their L1 (Bley-Vroman, 1989).

Another view is UG is not available after a critical (or 'sensitive') period. Few L2 learners achieve full native proficiency. If there is full access, no language should be more difficult to learn as L2, not just grammar, but also vocabulary, than any other, and this seems false. Some learners fossilize and overall success is variable. This is never the case in L1 acquisition. Thus, L2 acquisition requires problem solving, and other cognitive abilities, in a way that L1 acquisition does not. We always acquire our first language, unless there are cognitive factors preventing us from doing so.

Krashen's input hypothesis was well-attested to for L1 acquisition, but his 1982 study was the first to suggest that this may also be the case for L2 acquisition. Krashen suggested that L2 fluency is not acquired directly, but emerges over time. This implies that it cannot be taught. It requires interaction (input) to acquire native-like proficiency.

Long's interaction hypothesis was perhaps the first approach to look into the relationship between L2 input and proficiency. Long's hypothesis states that acquisition occurs once input is understood. So, interaction and conversational adjustments promote acquisition, otherwise, language acquisition may be random.

John Schumann developed a theory called the acculturation model in 1978. This focuses on L2 acquisition. It focuses on the psychological distance between the learner and the target language. There are a host of factors governing this distance. According to the acculturation model, there are nine classes of factors which can influence L2 acquisition. These are, in order, instructional, input, personal, aptitude, biological, cognitive, personality, affective and social factors. Based on these factors, we can say that the acculturation model deals with 'the social and psychological integration of the learner with the target language

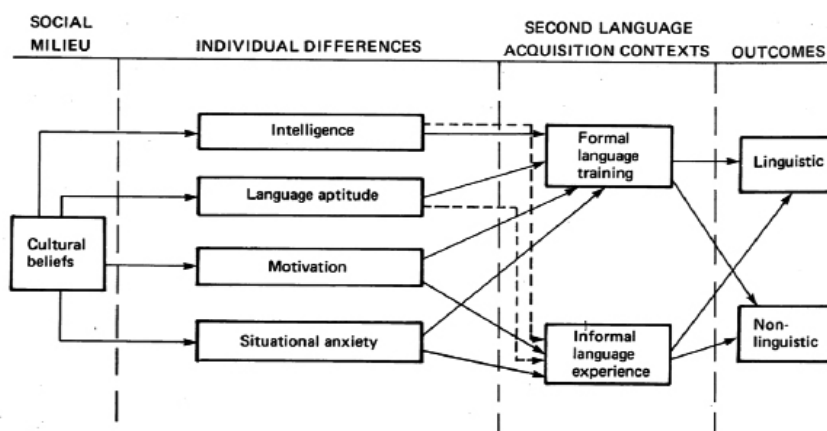


Fig 1. Gardner's socio-educational model (1985).

Many different factors affect second language acquisition

group’.

Finally, a lot of these models that have been discussed here came together in Gardner’s 1985 socio-educational model. As seen in figure 1, there are many variables, some already previously discussed in earlier models. These variables are intervening and logical: 1 influences 2, which then influences 3. This model does not emphasize socio-structural factors, but it does acknowledge them.

3. Child Language Acquisition

Children rapidly acquire a complex abstract language system, unless an impairment is present. Humans are not aware of it happening – it happens subconsciously. Children acquire language early, in roughly the same basic ‘order’ across languages (Katsos *et al.*, 2016). Stromswold (2000) talks about uniformity in language acquisition. This is uniformity, not universality, like Universal Grammar. Babies are born sensitive to many of the phonetic contrasts needed for sound classification and word discrimination, even in vitro. As early as a few days old, babies are able to discriminate between their mother tongue and a foreign language from a different rhythmic class. Humans usually speak their first words at around 9–15 months old (in English). From an initial slow vocabulary growth, there is a rapid increase of vocabulary (Benedict, 1979; Goldfield and Reznick, 1990).

Mistakes that children make are not random, and so child language is governed by rules. Even the mistakes that children make are quite stable; ‘Children make certain types of mistakes and not others’ (Stromswold, 2000, p. 910). Children are also resistant to correction. When correction takes place, it is not clear if it has any effect (Aitchison, 1998). Children generalize (specifically, over regularise) beyond what they hear (hence don’t merely mimic), in systematic ways. In this way, children are actually quite productive in their language. Errors tend to be with language morphology.

In the UG/full access hypothesis L1 and L2 acquisition is essentially the same process, but with different starting points. Flynn (1987) argued full UG access for both child L1 and adult L2 learners. Learners can acquire principles and parameter settings in L2 that are not used in L1. Learners may also have indirect access: via L1 with parameters fixed to L2 settings. It is possible that learners may only have partial access: some settings are available, others are not.

Much like children can produce utterances without ever being taught them or having ever used them before, learners do not produce ‘wild grammars’, i.e., grammars that no language would produce. So, it could be constrained by the UG hypothesis. Some principles and parameters seem easy to reset, but others are very difficult. So, in this hypothesis, there may be partial access only. This is in L2 acquisition contexts only.

Like other elements of an infant’s development (often referred to as ‘leaps’), a child’s

language development is marked by a set of milestones (Singleton, 1989, p.8).

“The learning of the mother tongue (L1) is normally an inevitable process” (Penfield and Roberts, 1959, p. 240). Uniform development occurs irrespective of a wide range of individual, social, and cultural variation in input. This is again, if there is no cognitive impairment present. Children under 10 can additionally recover well from language disorder resulting from brain injury. They re-learn language. Adults do not recover in the same way.

Extreme cases of child neglect and other factors where children learn their first language after puberty show that children do learn their native language, but with some problems. However, the evidence does show that such unfortunate children learn their L1 language to a reasonable level, but still within a certain time frame. The age of onset (AO) after the age of 6 or 7 seems to result in incomplete attainment in L1. See the well-known cases of “Genie” (Curtiss, 1977, 1988), “Chelsea” (Curtiss, 1988, 1989), and “Isabelle” (Davis, 1947).

Most of this research has been done in American and British English. We don't know much about this in other languages.

4. Age and Language Acquisition

The language input may vary from child to child, but ultimately, we all end up with an L1. All who learn L1 normally, through natural means, achieve native-speaker competence, even with these varying contexts. Children are perceived to do better and to learn more easily. Few who learn a L2 achieve this. Research has suggested a 'critical period' or a 'sensitive period' which is a phase after which learning by natural means is difficult or impossible. Therefore, a native-like performance in L1 (as we have looked at in the previous section) or L2 may not be achievable after a certain age.

4.1 The Critical Period or Sensitive Period

The critical period hypothesis (CPH) is not a new theory. Penfield and Roberts (1959) and Lenneberg (1967) proposed the CPH on the basis that brain maturation and brain lateralization is complete by puberty. This simply means that our brains lose their flexibility, or at the very least much of their flexibility, by puberty. This is also referred to as neuroflexibility. The duration of the critical period is likely to last from 2 to 13 years - with a gradual decline after that. The start of the critical period may coincide with the end of the period of growth in the brain. This all applies to L1 acquisition.

Lenneberg's key points (1967, p. 179) included the lack of maturation, which refers to the fact that the brain stops developing after puberty as it did before. The brain already comes with an inability to reorganize, and comes with cognitive structures and neurostructures, which may inhibit language. Another key point is that after a certain age, certain linguistic functions are fixed and set within the brain.

The CPH is connected with the 'sensitive period hypothesis' (SPH) (Harley and Wang 1997, p. 20). The two terms are often used interchangeably. The only real difference between them is that the critical point is quite rigid, whereas the SPH has no cut off point. It introduces the idea of phases, not fixed points of language development. These phases do not stop suddenly and firmly, but instead fade, perhaps by puberty (Harley and Wang, 1997, p. 20; Long, 1990, p. 252; Oyama, 1978). There is also the idea of multiple CPHs. Seliger's 1978 study said there may be critical periods for each aspect of linguistics, for example a critical period for morphosyntax. These are referred to as offsets and onsets. Other periods may be more sensitive. There may be other windows for other linguistic aspects, such as pronunciation etc., and these windows of time may be smaller or bigger.

If there is a critical period for language learning, there are implications which affect L1 acquisition as well as L2 acquisition. Different learning abilities may be used or needed after the critical period. Then the question is can these abilities be as effective? Languages learned after puberty would need to be learned in another way. Ioup et al. (1994) suggested that, if there are exceptions to the critical period, the assumed neurocognitive change does not happen in the usual way. It remains uncertain whether the ordinary acquisition system continues to function or whether an alternative learning system takes over.

4.2 Age and Language Acquisition: Empirical Evidence

Most of the available empirical evidence suggests that puberty is the cut off point for optimally learning a second language. Lenneberg's 1967 assertion that puberty seems to be the end of the period where language acquisition is optimal has been often cited in subsequent research. Penfield and Roberts asserted before Lenneberg's study that 'there is a biological clock of the brain' (1959, p. 237). They suggested an age limit of approximately 9 years regarding cerebral flexibility.

Lenneberg said that 'automatic acquisition from mere exposure to a given language' seems to disappear after puberty, and foreign languages have to be taught and learned through a conscious effort. Foreign accents can't be overcome easily after puberty (1967, p. 176). He also labelled the time span between age 2 and puberty a critical period for language acquisition (1967, p175).

Age of arrival (AOA) of immigrants speaking English correlates strongly with performance (native-like grammatical judgements) (Johnson and Newport, 1989). There is a gradual decline at AOA until around the age of 15. There is no effect after 15 years of age. So, there may be a cut-off point at 15, at least for morphosyntax. For morphology and syntax, Long (1990) also concludes on the basis of his review that the age of 15 seems to be the upper limit for nativelike abilities. However, there are indications that the age of 6 or 7 may also be relevant for morphosyntax and lexicon (Johnson and Newport, 1989, Hytlenstam, 1992). Studies by Asher and Garcia (1969), Oyama (1976, 1978), Patkowski (1980) show similar correlations.

In a more recent replication of the Johnson and Newport 1989 study, DeKeyser (2000) managed to avoid most of the methodological weaknesses that plagued the 1989 study. But there were issues with this study, too, including no native English controls being used. Subsequent research suggests language acquisition begins at birth – very recent studies indicate that it may begin in vitro, before birth (Partanen et al., 2013). Ruben even suggests that a critical period for phonology might already terminate by age 1, and he further speculates that ‘insufficient early phonological input results in flawed semantic and syntactic capacities’ (1997, p. 117). Other researchers believe that the critical period process is completed well before puberty, possibly at the age of 5 or earlier (Krashen, 1973). Another general belief was that full native-like proficiency in a first language is attainable given age of onsets up to the age of approximately 6 or 7, data showing effects of deprivation during very early phases call this contention into question, as mentioned earlier.

Bever (1981) proposed an often-quoted exercise hypothesis - ‘use it or lose it’. If language learning is not exercised early, capacity will disappear with maturation. Bialystok and Hakuta also said that ‘there appears to be nothing special about the age range before puberty’, and rather ‘the decline in proficiency remains constant across ages’ (1999, p. 175).

The recent prevailing view was that among children, adolescents & adults: adolescents and older learners learned faster than young children and young children learned better in the end. ‘Better’ is defined by pronunciation ability and ultimate level of achievement. (Krashen, Long and Scarcella, 1979, p. 573). A critical period must have an identifiable offset (or terminus). As we can see here, this terminus is not definitive.

5. Environment and Motivation

We can see that there is no one satisfactory way for learners to acquire language. So, there must be more to it than what we have discussed here so far.

5.1 Environment and Second Language Acquisition

The Universal Grammar hypothesis has led to a trend towards trying to ascertain which aspects of UG might be available in the formation of L2 grammars. But we should remember that UG does not explore performance of social or contextual uses of language.

Cognitive factors may also have a big effect. The central concern with cognitive factors is that adults may not have access to UG and that the resulting parameters become harder to reset. The cognitive immaturity of a child may be an advantage (Newport, 1990) and there is less language processing. Long suggests that it would be also surprising if social/psychological factors were shown to have no effect at all on L2 outcomes (1990, p. 254).

Long-term studies (comparing achievement after several years of foreign language study and/or residence in the second language environment) have found that younger starters

consistently outperform older ones, and that only those who begin learning a second language as quite young children are ultimately capable of native-like attainment, even after many years of target language exposure. Learners starting later than age 6 often become communicatively fluent (Long, 1990, p. 265).

Regardless of the evidence model we use, speech is a complex process. However, the human brain seems to be able to do all of this very quickly. After we produce speech, once the utterance is produced, it needs to be understood by a listener. This leads to further issues with speech comprehension. There is often some ambiguity regarding speech, even among native L1 speakers. Words can be interpreted in different ways. This can be affected by environment and cultural factors.

Environmental factors play a part. An adult's cultural identity may be firmly established in their culture regarding L1 acquisition. This may have an effect on how they acquire an L2. In a school/classroom environment children (hopefully) receive more helpful and more directed input, as well as having more interaction with peers. Harley and Wang (1997, p. 24) point out that the effect of environmental factors is "underplayed in critical period studies."

5.2 Motivation and Second Language Acquisition

Intrinsic motivation seems to be effective among adult learners. In studies, learners have often been characterized as being highly motivated (Moyer, 1999), or having a high degree of aptitude for language learning (DeKeyser, 2000, Harley and Hart, 1997; Ioup et al., 1994), or having received intensive and focused L2 instruction (Bongaerts, 1999, Moyer, 1999).

Motivation is a notoriously difficult topic - many educators would love to have a definitive answer for ways to increase learner motivation. While it is an important factor in language acquisition, it is not the only factor.

6. Bringing the Research Together

So far, the available empirical evidence suggests that early language acquisition is more optimal than later acquisition. And yet adult second language acquisition sometimes results in levels of proficiency comparable to those of native speakers. The debate now turns to what amount to judgement factors on what exactly is native proficiency in a language. The notion of "nativelike proficiency" is elusive (Hyltenstam and Abrahamsson, 2003). Hyltenstam and Abrahamsson also state that there are no published accounts of a single adult starter who has reached native-like L2 proficiency. Furthermore, given the frequent observation of non-native features even in very early starters, they suggest that absolute native-like command of an L2 may never be possible for any learner. More sophisticated, comprehensive and subtle tests are needed to fully ascertain this.

Some learners reported in Bongaerts (1999) and Bongaerts et al. (2000) appear to have

reached native-like L2 pronunciation. However, this study only focused on phonology. Long posits 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 (Long, 1990, p. 266). Neufeld also did some studies on accent and dialects in the 1970s, but the speech samples in these studies were extremely limited. (1978, 1979) Long (1990, p. 269) also summarizes three studies, by Patkowski (1980a, 1980b), Coppieters (1987), and Johnson and Newport (1989), suggest strongly that a sensitive period affects L2 morphology and syntax, too. This is not to say, of course, that syntactic development cannot continue late in life; it clearly can. It appears, however, that native-like attainment of an entire second dialect or L2 syntax is beyond the late starter. The same study (Johnson and Newport, 1989, p. 273), does not show that older children or adults are better learners. On the contrary, starting after age 6 appears to make it impossible for many learners (and after age 12 for the remainder) to achieve native-like competence in phonology. Starting later, more precisely after age 15, seems to create the same problems in morphology and syntax. It then concludes with (Johnson and Newport, 1989, p. 280) “language learning is typically somewhat irregular and incomplete if begun late (around age 6-8), and that the irregularities and shortfalls from native-like levels of ultimate attainment become more pronounced with increasing AO and are severe in cases of postpubertal learning.”

White and Genesee state that access to UG is unaffected by starting age, and thus that native-like proficiency levels in a second language are attainable even by adult L2 starters, at least in the domain they chose to investigate (1996, p. 261). It is worth noting that the research states that individuals who appear to have achieved native-like proficiency nevertheless differ from native speakers “in subtle ways” (1996, p.234).

It seems that the nature of input (amount, quality, etc.) is much more decisive in the context of second language acquisition. When we take into account the learner environment and motivation(s), the bigger picture regarding second language acquisition becomes much clearer, but also much more complicated to research.

7. Conclusion

There doesn't seem to be much opposition to the assertion that early learners have an increased chance to learn a second language. Krashen's general claims largely stand up to the available evidence, even if specific results differ. Given the available empirical evidence it is safe to say that earlier language acquisition is more optimal than later language acquisition. Language development occurs in a series of developmental stages, which often connect with, and separate from, each other. The available empirical evidence states that this occurs before puberty, and may happen from in vitro. If it is accepted that a critical, or sensitive period exists, most research accepts the terminus period as puberty.

However, it is also safe to say that it is absolutely possible for adults to learn a second language, and to become extremely proficient in a target language. The critical period hypothesis suggests that native-like speech in a second language is not possible after puberty.

What there does seem to be is a critical or sensitive period for certain elements of a language, for example, dialects and other specific linguistic features. These do not seem to be able to be replicated at a native-like level once acquired in adulthood. However, this does not mean that the adult second language learner is doomed to forever have 'broken' or rudimentary speech. Given appropriate input, an appropriate environment and appropriate intrinsic motivation, the learner can learn a second language at any age.

It is clear that more research needs to be done on adult second language acquisition. There needs to be more cross-sectional experiments done across varying levels of language attainment, rather than focusing on longitudinal studies, which focus on individuals or groups over many years. There also needs to be more research done outside of the classroom environment.

So then, what is the optimum age when it comes to learning a second language? Based on the evidence, ideally the younger the better. In vitro, at its most conservative, and just before puberty at least. While anyone can learn a language at age, it is appropriate to adjust one's judgements and expectations concerning acquiring a language to native like levels. It is not surprising that certain differences from first language speakers will emerge if one learns a second language, particularly if one learns a second language in a different (non-native) environment. More future studies need to examine the role of input, environment and motivation on learners of a second language.

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