

Learning a Foreign Language beyond the Final Exam

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Abstract

Although students are required to learn a foreign language in school, many do not retain what they learn and have trouble using it once they leave classroom. Often they feel they are simply poor language learners, yet all successfully learned at least one language as a child. Some strategies adults commonly use while learning languages include relying on corrective feedback, narrowly focusing practice on specific items and analyzing abstract concepts. While these strategies help accelerate learning in the short-term, they often lead to poor long-term results (Elman, 1993; Bjork, 1999). This paper identifies how current practices in adult language learning might be hindering long-term retention and outlines ways in which the learning process could be restructured to prolong retention and increase ultimate fluency.

### Learning a Foreign Language beyond the Final Exam

Perhaps one of the most remarkable accomplishments of human learning occurs universally within the first decade of life. By the age of six, children acquire a vocabulary exceeding 10,000 words (Anglin, 1993) and a full command of basic grammar (Brown, 1973). By contrast, foreign language learners who begin learning in adulthood, even with their far more refined cognitive systems, will often never fully reach the grammatical proficiency a child does - - even after decades of exposure to the target language. For example, around the age of three children learn how to correctly distinguish between the English articles 'the' and 'a/an' (Brown, 1973), whereas an adult immigrant not used to this distinction might go their whole life distinguishing the two incorrectly. In fact, after age six, it appears the older a learner is when they start learning a language, the worse their long-term success in the language will be. This decrease continues until around puberty -- after which time, the outcome of learning a new language becomes uniformly poor (Johnson & Newport, 1989). This discrepancy between the highly developed cognitive capacity of adults and their poor ability to learn language has baffled linguists, leading many to take the position that language development in children must be assisted by an innate ability to decipher and learn languages. This ability then begins to atrophy between age six and puberty, at which time it is no longer useable and a foreign language must instead be learned through the same learning processes one would use for other non-language related skills (Chomsky, 1957; Lenneberg, 1967; Pinker, 2002).

While this explanation provides an account for why ultimate attainment patterns drop between six and puberty, the correlational nature of its support makes it important that we be cautious about making decisions based upon it for our classrooms. As with any correlation involving age, a myriad of confounding variables exist, making it difficult for us to see the whole

picture. Two alternatives deserving consideration are either that a third variable also correlated with age is responsible for diminishing ultimate attainment, or that age is simply one of numerous factors contributing to the decline. For example, early last century a series of correlational studies argued that raising a child bilingually would lower their intelligence (Smith 1923, Saur 1923). Consequently, parents acting on these findings unfortunately took steps to purposely limit the foreign language exposure of their child and prevent them from being raised bilingual. Evidence developed since then, however, has shown this not to be the case (Peal & Lambert, 1962) and that such children were needlessly deprived of one of the simplest ways of achieving multilingual fluency. Many researchers now see these early findings against bilingual intelligence as conclusions drawn by mistakenly using correlation to implicate causation, in which extraneous socioeconomic variables such as stress and poverty were confounded with the immigrant populations sampled for bilingual participants.

One alternative explanation for why adult language learning potential is so low is that the learning environments constructed for adults may be oriented toward increasing the speed at which adults learn, even if at the expense of the long-term potential they can attain. Bjork (1999) provides numerous examples of teachers modifying their teaching practices in ways that increase immediate performance on students' exams; however, performance gains are not sustained over time and may actually impair long-term learning. Likewise, adults who move to a foreign country and learn a new language through immersion may be tempted to employ similar strategies to expedite their learning. This explanation would then be consistent with findings that although children are often regarded as miraculous language learners, adults do, in fact, progress through their initial stages of language learning at a faster rate (Snow & Hoefnagel-Höhle, 1978).

To date, little work has been done looking into the long-term effects of various language teaching practices on students' eventual attainment or outlining how adults could be brought closer to the levels of ultimate fluency that children reach. Traditionally this has been because of the extensive duration needed to conduct longitudinal studies on language learning, and the belief that adults' diminished potential is due to a biological and irreversible loss of the ability to reach the levels they were able to attain as children. Still, as can be observed by talking to non-native speakers of English, there remains enormous variation in how proficiently adults learn a foreign language – with little speculation about how the cognitive processes involved in their initial acquisition of the second language might be affecting their current proficiency. As a starting point for understanding why this might be, we can look at how differences between the strategies children and adults use to learn languages affect long-term learning when used to acquire skills besides language – where long-term effects are more visible.

#### *Corrective Feedback*

Initial observations examining the differences between child and adult language learning identified the discrepancy in the amount of corrective feedback each receives when making a grammatical mistake. Though adults may stop to correct children when they say something untrue, they almost never correct children when they say something ungrammatical (Chomsky, 1975). By contrast, if an adult produces an ungrammatical sentence, the listener is far more likely to inform the adult of the errors in their sentence structure. In the short-term, this use of corrections helps learners to quickly address mistakes they have made and rectify them before the final exam. In the end, however, frequently providing immediate corrections when a mistake is made can stifle results.

When first observed, children's ability to learn without corrective feedback was thought to be a phenomenon unique to child language acquisition. However, recent findings show that the ability to learn without explicit feedback is by no means specific to first language acquisition, nor is it unique to children. Studies employing vernier discrimination tasks present participants with two lines segments almost parallel, but with one line offset minutely to the left or right. Adults trying to report the direction of the offset line are able to improve their accuracy simply by repeating the task – even if no feedback is given as to the correctness of their answers (Fahle & Edelman, 1993). While providing feedback on participant's individual responses in these tasks can accelerate learning, providing rare and infrequent feedback achieves the same rate of improvement (Herzog & Fahle, 1997). If, for long-term results, only minimal levels of feedback are necessary for learning, it is possible children could get all the feedback they need from implicit cues -- such as a parent going out of their way to model the correct answer:

“Mommy, I goed to school yesterday!”

“Yes dear, you *went* all by yourself!”

Participants in another study were taught the computer language LISP through a software-training program (Anderson et al., 1989). In one group, the program was set to give corrective feedback to learners on mistakes they made, whereas in the other group this feedback function was turned off. While the group with the explicit feedback began learning the language significantly faster, neither group showed an advantage by the end of training.

Besides being unnecessary, further evidence suggests that immediate corrective feedback, such as that a teacher might give when a student says something ungrammatical, can be damaging to long-term learning (Goldstein & Rittenhouse, 1954). In training motor tasks, learning can be accelerated by providing corrective feedback after each attempt at a task,

however, participants who receive feedback only after each set of 15 attempts ultimately master the task with greater proficiency (Schmidt, 1988).

With this negative relationship between corrective feedback and ultimate potential in mind, we can speculate about how teaching strategies may have a similar relationship in language learning. A teenage or adult learner is likely to seek out extensive corrective feedback on their language skills – perhaps hoping to improve their short-term performance for the next exam or encounter with somebody who only speaks the target language. However, similar to other learning tasks where corrective feedback is high, the long-term results might be poor. By contrast, children below the age of six learn through few grammatical corrections and ultimately achieve native-level grammatical competence. While this is again a correlational relationship, given that it is a causal factor in other domains of learning, it deserves consideration as at least one potential causal factor in long-term language proficiency.

#### *Textbook Organization*

Like corrective feedback, two other learning strategies, massing practice of a specific item and reducing variations in examples, are also uniquely used in adult language learning environments and known to create poor long-term memory representations. When opening any standard language textbook, content tends to be massed into distinct sections:

Chapter 1: Present tense, Chapter 2: Food, Chapter 3: Numbers. In the short term, this taxonomic organization can allow learners to feel more in control because they can focus their studying on the specific content for a given section. In the long term, however, this organizational structure might be less efficient than a more integrated design.

To better understand why massing could be ultimately harmful, we should first look at the memory framework outlined by Bjork (1992) in his “New Theory of Disuse.” His theory

proposes that memory strength is doubly indexed by both *retrieval strength* and *storage strength*. Retrieval strength represents what a layperson might intuitively call memory. Simply put, if retrieval strength for an item is above a certain threshold, it will be easily recalled -- if it drops below that threshold, the item will appear forgotten. Building retrieval strength alone is helpful for keeping an item retrievable in the short-term — such as an upcoming exam. This is built up rapidly through massed practice sessions, though it deteriorates with time.

For those concerned with long-term retention, storage strength is the index that determines both how well memories will be maintained over time and how effectively prior learning can “come back to” learners – such as once they are placed in a foreign country and need to recall everything they learned in the classroom. For example, think of the phone number you had when you were 11 years old. For many people this number cannot be immediately recalled, as the retrieval strength for that item is below threshold. Should they, however, move somewhere new where they was assigned the exact same phone number they had as a child, they would likely re-learn this number with ease due to the extensive storage strength they built up for it as a child.

With this distinction between retrieval and storage strengths in mind, the primary goal of foreign language teachers should be to maximize their student’s storage strength of the target language. One way to achieve this is to space practice of a given item, such that retrieval strength will drop more in the intervening time between practice sessions. This way, instead of quickly retrieving words by using associations specific to events the week they first learned the word, students must work to think through and rebuild the retrieval strength that was lost during the intervening time; this process of rebuilding retrieval strength simultaneously increases storage strength. While this may frustrate learners more as they will have to think harder to be able to

retrieve the item from memory, eventually, storage strength will be boosted considerably higher than if retrieval strength remained high enough to retrieve the item effortlessly. For example, in a unit on the present tense, students might first be assigned a massed set of fill-in-the-blank exercises focusing on present tense is-are usage:

- (1) Mervin \_\_\_ caffeinated. [is]
- (2) Mervin and Raoul \_\_\_\_ caffeinated. [are]
- (3) Vladimir \_\_\_\_ melting. [is]

Students performing these exercises in one session will likely answer question three with little effort. This is because having just performed exercise one, the association between a single person subject and using 'is' instead of 'are' remains highly accessible, such that when answering question three they simply need to remember the act of answering question one, instead of remembering why the answer is singular. On the other hand, if question three were practiced a week later, it would be more difficult, but the long-term benefits of a successful retrieval would be far greater – as the extra work put into recovering the diminished retrieval strength needed to answer question three would also increase storage strength.

In addition to the problems created by massed practice of grammatical skills, the thematic structuring of language textbooks creates difficulties for memory of vocabulary items. One of the most important mechanisms of memory involves the importance of associations and cues. As an item enters memory, it establishes links and ties with everything that might be associated with it: other learned items, the mood of the learner, the presentation style of the item, the smell of the environment, words that might rhyme with the item, etc. (see Roediger & Guyunn, 1996). All of these associations then become the keys for being able to successfully retrieve the item back out of memory by providing cues in which a specific item can be differentiated from other items in

memory. One common way in which memory retrieval fails is when too many items are all associated with the same cue – thus making it no longer useful for distinguishing a specific item to be recalled (Watkins & Watkins, 1975).

For example, try to remember what you were doing both last New Years Eve and the evening of January the 13th. Most likely, you had a much easier time remembering last New Years Eve, than January 13. This is because everyone around you was acting outside of their normal routine on New Years Eve -- leaving a unique set of associations to all memories encoded on that day. All cues for January 13, by contrast, are probably similar to those for January 12 and January 14, making it more difficult to retrieve only what was happening January 13.

To illustrate this further, one can imagine driving down a country road and seeing a series of telephone poles going by (Crowder, 1976). If two poles were built with only a one-foot distance separating them, as the observer travels further away, it becomes visually more difficult to identify each individual pole – but rather only the clump of poles can be seen. However, the greater the spacing between the poles, the greater the distance becomes at which a clear perceptual distinction between individual poles can be made.

Now consider what happens when a foreign language teacher begins a unit on food items. The teacher is likely to stand in front of the class, write ‘fruits’ on the board, and present the vocabulary for a series of fruits in the target language. By presenting items to be remembered in this manner, the teacher leaves very little room for distinctions in cues associated with the different fruits to develop -- as little changes in either the learner’s mind or environment during the short intervening time between items. In an experiment designed to measure the effectiveness of learning items in categories, Roediger (1973) presented participants with words to memorize,

divided into different categories containing four, five, six, or seven items. Correct recall percentage for items within each category decreased linearly as a function of how many items the category contained: .69, .65, .64, .59. Thus, integrating a few vocabulary items from a variety of different categories may be more effective than assigning a full category for a week's vocabulary assignment.

Another dangerous long-term consequence of teaching categorized vocabulary is that when words are then recalled together, items must compete against one another until the correct item is distinguished – suppressing all the other items in the category. This suppression appears to impair how easily the suppressed item can be subsequently retrieved. To demonstrate this, Anderson et al. (1994) introduced participants with various categories (fruit, drink, etc), and a set of common items from that category (fruit-orange, fruit-banana; drink-scotch, drink-gin; etc). As one item was practiced (i.e. fruit-orange) recall ability for other items of its category (i.e. fruit-banana) decreased – though items in other categories remained unaffected (drink-scotch/gin).

This effect, however, might be avoidable in the foreign language classroom if the lessons were interspersed with items from different categories, in order to increase the temporal spacing between presentations of similar vocabulary items. If students in a language class learn the word for 'banana' in a lesson on fruit vocabulary, later when they recall 'fruit lesson-banana' they must repress 'fruit lesson-apple.' However, if the students learned through the associations 'week on reading curious George -banana' and 'week on reading snow white – apple', even as time goes by these items are more likely to remain distinct and not interfere with one another. Additionally, some students may find it easier to make meaningful associations to something natural like a children's story than something abstract like a fruit lesson.

*Overusing Analytical Abilities*

In addition to providing a greater potential for meaningful and long-term associations to form, orienting curriculums away from massed practice of abstract grammar rules and categorized vocabulary toward real-world contexts could improve transfer of classroom knowledge to communicative fluency. One can easily imagine, or has perhaps experienced, the frustration of having learned the grammar of a foreign language in a university, yet being unable to understand and communicate in even child-level conversations when traveling to a foreign country and being immersed in that language.

There are likely many reasons for why this poor transfer of classroom learning to fluency in another language occurs. One explanation is found in the framework of exemplar theory (Logan, 1988), which proposes that each time a task is performed, a record of it is made in memory as an 'exemplar.' At first, when learners have no exemplars stored, they will tend to use some sort of algorithm or explicitly memorized instruction to complete a task. As they perform the task, they begin to store more exemplars of how to complete the task. Eventually, they will possess a large enough repository of exemplars that the original algorithm will fade away and they can base their knowledge of the task based on the stored exemplars instead. How versatile and able to handle variations of the task learners will be is then dependant on the diversity of the underlying exemplars supporting their ability to perform the task.

In a traditional curriculum designed to progressively teach a sequence of grammar rules, time is first dedicated to teaching an explicit algorithm used to generate sentences of that rule. Next, a series of practice exercises are assigned to help solidify memory of that rule; generally, these exercises are stripped of all variability to try to focus explicitly on the target rule and resemble the final exam as closely as possible. This lack of variability allows only a very narrow

and unnatural set of exemplars to be stored. When learners are then immersed in a native context, they rarely find themselves in a context close enough to their classroom-learning environment to be able to communicate fluently only from their exemplars. Rather, they must use their meta-cognitive skills to quickly fill in gaps unaccounted for by their underlying exemplars and rapidly bring themselves up to the fluency needed for regular communication. This, however, leaves them with an awkward patch-and-fix development sequence, based more upon which modifications are needed than accurately observing the language.

Child learners, by contrast, are never taught any explicit grammar from which to formulate an initial algorithm. Rather, they begin by recording a large and diverse set of exemplars based on years of hearing correct examples, slowly putting them together as their cognitive abilities develop. While this path leads to a slower development of language ability, there is reason to believe it leads to better long-term results. Recurrent neural networks programmed to simulate the learning of grammar are able to successfully generalize the grammar rules of a language from a corpus of examples when their meta-cognitive abilities, represented as a variable simulating working memory capacity, is gradually increased while the computer works through the examples. By starting the network's capacities at levels designed to simulate adults, however, the network no longer synthesizes the optimal rules of the language's grammar (Elman, 1993).

Besides allowing them to begin using a language feature before they have stored a full knowledge about its variation, adults use of more advanced cognitive functions to accelerate learning of a specific language feature can run into long-term problems when they generate the wrong algorithms to begin with. This effect can be most clearly illustrated in the case of pronunciation. Letters in an alphabet often represent a series of motor movements. For example,

'z' in English usually represents a movement of the tongue to the front of the mouth and vibration of the voice box -- in German the voice box is less active. As a student begins reading from a German textbook, they will likely think about words containing a 'z' as being pronounced with a voice box vibration; subsequently, English learners can end up with an accent over emphasizing voice box vibrations on the letter 'z' when speaking German – which often lasts throughout their life. If students are to learn a vocabulary word for a weekly unit by reading a textbook, the fastest option they have is to use knowledge of their first language to generate a guess as to how the word would be pronounced. If, however, they had regularly heard and learned to pronounce the word beforehand, by the time they are exposed to the written form of the word they would not need to rely on external knowledge to guess how it might sound.

#### *Reforming Adult Language Learning*

One belief that may be preventing the reform of classrooms to address long-term concerns is the notion that learners should do whatever is necessary to rapidly reach the proficiency demonstrated by a final exam – and then from there they can work on solidifying their knowledge for long-term use. As mentioned earlier, patching up holes in one's language development caused by using meta-linguistic abilities to accelerate the learning of specific language features may not lead to the same results as having learned them through exposure to a variety of examples in different contexts. Jacoby (1978) further demonstrated how when an item to be remembered is first learned poorly and then later learned well, it is remembered worse than if it was simply learned well once. Here participants first read a word to be remembered in a one study session and then in a second study session were to perform a task in which they had to fill in certain letters that were missing from the word they were to remember – leading to a deeper level of processing for that word than simply reading it. A second group only did the task filling

in the missing letters, without having a prior reading study session; they exhibited better recall than the first group. Likewise, once language learners develops a foundation for speaking a foreign language that allows them to be understood and pass tests, they will likely only modify that foundation to meet their immediate needs, rather than starting from scratch to build a deeper representation.

While the ideal solution for language learners trying to form a solid foundation for learning a language might be to go to that country and start acting like a child again for several years until they slowly build up adult-like communication skills, this is obviously not a practical solution for most adults. Rather, what is needed is an investigation of how the principles outlined in this paper that appear in child language learning and are likely to have an effect on long-term learning in adults can be addressed without sacrificing the faster rate at which adults proceed initially. One step could be to re-orient the organizational structure of our textbooks to increase the amount of time learners are exposed to a target language feature before they are expected to begin using it and start receiving extensive corrective feedback. Currently, a few narrowly focused new items are introduced at the beginning of a chapter, with the goal that a learner will have mastered them by the end of the chapter – often encouraging corrective feedback, massed practice and reduced variations in order to be able to produce the item by the end of the chapter test. Instead, we should introduce as many items as possible early on, but keep our initial expectations low as to how much the learner can do with the items. For example, rather than first spending a week on food, then a week on numbers and then a week on shopping, the first week all three would be introduced (e.g. “I want three bananas”) though learners might at this point only be expected to recognize everything they are to learn. By the second week, students might be expected to speak and not until the third week write about and be strictly corrected on all three

units; by the end of the third week, students would be at the same position as if they had learned each chapter progressively. This triples the spacing each item receives, gives a longer duration in which learners can see and record exemplars of the correct forms without corrective feedback and allows content designers to create more natural contexts with which learners can associate new items -- as they have a wider range of words to incorporate into their examples and exercises.

Besides changes within the classroom, many of the concerns raised in this paper could be addressed by changes in the homework assignments we assign. So far, trying to get learners to engage in extensive foreign language practice outside of the classroom by assigning additional practice has seen limited success -- as the traditional methods of rote memorization and massed studying require strong motivation and perseverance to complete. Modern technological developments, however, are opening numerous possibilities for providing learners with convenient ways to practice a foreign language outside the classroom in ways that are conducive to long-term fluency (Purushotma, unpublished manuscript). For example, rather than massing memorization of vocabulary into a dedicated study session, a ticker symbol program could display vocabulary at expanding intervals while waiting for web pages to download. Many junior high students have both Spanish class, where they practice writing Spanish sentences for homework and typing class, where they repeatedly type out English sentences. Rather than assigning additional rote homework, translations and pronunciation could be built into a Spanish typing tutorial. Beyond being incorporated into everyday routines, correct exemplars should be made both more effective and interesting by incorporating variation and context. Popular computer adventure games have already been translated into most popular foreign languages; coupled with voice recognition technologies this offers enormous potential for recreating natural

foreign language contexts. Recently, Simon and Schuster Corporation released a popular foreign language learning series dubbed “The Pimsleur Series” based on all-audio prompts for the learner to imagine situational contexts while driving or walking to class. With imagination drawing on the same brain structures (Wheeler, Petersen, Buckner, 2000) and often providing the same results (Eich, 1985) as direct sensation, the ultimate effectiveness on pronunciation and knowledge transfer of prescribing this series to students should be of great interest to researchers and teachers alike.

With the upcoming potential for new innovations in language teaching, it is especially important for evaluators to understand the long-term effects of different techniques and to remain cautious of strategies that feature short-term gains, but might ultimately incur harm; such as over-relying on overt feedback, massing content by categories, reducing variations by streamlining classroom examples to match the exam, or relying on advanced analytical skills to generate answers. Rather than dismissing the miraculous language learning abilities of children as purely biological, I hope we instead are able to recognize and implement any potentially beneficial conditions in their learning environments that may be lacking in that of adults.

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