Linguistic cubes

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This paper describes the concept of linguistic cubes. This concept helps better understand how a new language has to be learnt.

The following is my personal opinion emerged from my experience of learning languages. The first thing I want to mention is that I, having more of an analytical type of thinking, am really bad at learning (and speaking) languages. So bad, that even my native language is a bit cumbersome. When I see a new phrase in a foreign language, my brain tries to analyze it without my will and completely refuses to remember anything. I have been living in an English speaking country and had been learning English for 15 years before I was able to speak not being afraid of making grammar mistakes. At this moment I truly believe that I know the way how to make the brain learn a new language. I believe that by having a 100 percent dedicated teacher it is possible to learn a new spoken language in just a month starting from the absolute zero.

In the text below the verb "learn" is used in a very specific and narrow sense: obtaining the skill of fluency in language rather than obtaining knowledge. This sense is what we mean when talking, for example about learning to play piano or riding a bike. The skills that are learnt are purely non-verbal knowledge, i.e. something that a person is able to do but cannot explain how it is being done.

Also below I will use the terms speech, listen, and speak referring to all possible channels of natural language of communication including reading and writing.

What is Language?

In this paper I define the language as the following. Language is a set of abstract symbols and rules to interlink these symbols which help one person guess what another person wants to express. Here the word "guess" is used intentionally to underline that sentences in a natural language do not have the exact meaning, because the elements of thinking which are expressed by the language sentences are not formally defined, as, for example, in computer languages. The miracle of communication is nevertheless achieved by the feedback reinforcement that exponentially reduce the probability of being misinterpreted.

The ability to speak and understand speech is hardwired into a small place in the brain's neocortex. The mechanism of generating correct sentences is made of a specific wiring between neurons. In this view learning a new language is a process of constructing this mechanism inside the cortex. Hence the knowledge of the language is a non-verbal skill and cannot be learnt by studying.

We often translate when learning a new language. But translations between the new language and known language bind two symbolic systems that lead to superfluous knowledge which is 1) not useful for speech; 2) not strong and gets forgotten easily; and 3) interferes with links between thought concepts and the symbolic system of the language being learnt. The translations can be used only to understand the meaning of a foreign phrase, i.e. the intention of the person who speaks to express their thoughts and the result that is expected when the spoken phrase is understood by the listener. This is important because the ability to speak the language comes from the ability to think within that

language. So remembering translations would impede your learning process because translations create bonds between symbolic representation of two different languages and not the process of thinking.

On the other hand, binding the language symbols to images, processes (be it either real or abstract) and other cognitive data (e.g. feeling sad) is what builds the language mechanism, since the mental activity that generates the sequence of language symbols uses the same direct pathways that does the opposite job – recreating mental process by decomposing the sequence of language symbols.

When learning a language, fluency is a must, because it automatically eliminates translation bonds between symbols of two different languages.

What is a Linguistic Cube?

I imagine a language as a three dimensional space in which sentences are represented by short threads. The first dimension is lexis – the collection of all the words a person uses when speaking. The second dimension is grammar, including morphology, syntax, idiomatic expressions, and exceptions. They are the rules of the language that differentiate grammatically correct sentences from incorrect. The third dimension is the context in which the speech is born. The context defines the meaning of a particular phrase, sentence, or other piece of text and it collapses polysemy (capacity for words and phrases to have multiple meanings) into one specific interpretation. This meaning is tightly related to the intent of the speaker to convey the message. The phrase can be understood in this sense only when the person listening to the phrase knows what the speaking person is trying to say. This third dimension makes the language complete by making information transfer possible; because grammatically and lexically correct sentences without context do not make sense and do not contain semantic information.

The property of our brain is such that the correct sentences without context, and as a result without the meaning, are ignored. This suggests that the brain will not be constructing useful neuronal connections if the speech is stripped out of context. However, having context gives a spectrum of effects from weaker to stronger. Meaningful phrases that are not important to the listener do not make as much impact as those which are. Moreover, the more context emotionally close to the listening person, the more meaning phrases have, hence stronger bonds are created.

A linguistic cube is a unit of speech limited by a set of words, a set of grammar, and the context in which the speech occurs. A linguistic cube represents an entity that remains constant even when changing words, grammar, or context. Also a linguistic cube has the property of irreducible complexity, i.e. the process of reducing a number of words, grammar or context simplification stops when the core information is affected. A simple example for this can be a joke or anecdote. You can change words, use different grammatical constructions, or place the plot into different contexts. However, when simplifying, you stop at some point because by further reduction you would lose the idea of the original story.

Linguistic cubes are recursive – their sub-cubes are also linguistic cubes. Breakdown can go up to the words. For example, a spoken word “runs” could be well understood in the computer program context.

Since fluency is a necessary condition of learning a new language, the way of getting incremental process of learning is to train the student fluency within a selected linguistic cube, and only then going to one of the following options (or their combinations):

1. Expand word base, keeping the same grammar and context;
2. Expand or change grammar, e.g. change tense, voice (active/passive), actor, etc;
3. Change context while keeping the same words and grammar; or
4. Select a different cube.

Let's call the union of all cubes known to the student a supercube. The goal of learning is expanding the supercube either by conversations and explanations within it, or by external information coming from human senses, but not the translations to the native language. New phrases have to be explained using the known words, phrases, and contexts or using other senses: videos, images, sounds, etc.

The development of the supercube can be described as the following. The units of learning (exercises) can consist of irreducible linguistic cubes. A piece of text of a cube is broken into words and phrases. Then the student learns words (lexemes) and phrases (grammar) in other much simpler contexts. Once the learning is fluent, the original text is presented. The goal is fluent understanding at first go. If not achieved, the text has to be memorized. This is recursive, so smaller contexts follow the same rule. It is important that the cube represents something that makes a difference in the outside world (again be it imaginary or real). This is the case when the mind gives significance to the text and builds linguistic bonds.

Feedback of spoken phrases is essential. The brain will reject the phrases that do not make any impact on the outside world. If using an analogy of learning to play piano, the result of your spoken words must be easily visible for your brain to give it enough significance, which is as important as hearing the sound of the piano when pressing the keys. If there is no effect of the spoken words, it is the same as learning to play piano without actually hearing the sound of it.

Another useful analogy is the engine of a car. The ability to speak is like having an engine in the car. You can know everything about the engine but if the car does not have one it will not move. Learning to drive your car without feedback (effect of your spoken words) is like a learning to drive without the car actually running. The correct exercises move the car little by little and build the engine inside – the way our brain works.

Suggestions to the language learners

1. **Skill, not a knowledge:** The ability to speak is not a knowledge, but a skill to think. So any explanation of concepts in another language, be it translations or grammar, is detrimental to the learning process.

2. **Emotional attachment:** Pick a topic for which you have emotional attachment. This will help your brain to focus better on the topic, hence constructing language patters more efficiently.

3. **Passive learning:** When you get an understanding of speech on a particular topic, then just by listening to the speech your brain learns and polishes understanding ability. This may be seen as passive learning.

4. **Self-learning:** Do not ignore immersing yourself (actually your full focus) into the language on a regular basis. When you feel frustration about not progressing, then exercise even more. Do not underestimate the capacity of your brain to self-learn. You remember that sometimes we sing a song in

the head without listening to it. Our brain repeats curious things without our will or attention. When those “songs” become the phrases in the language you learn, then you know you hit the jackpot – your brain is self-learning – it repeats things which it struggled with in the recent past.

5. **No thinking:** When learning, the mental logical analysis must be switched off. Otherwise it interferes with the learning process. This is easier for children and humanitarian people due to their nature of thinking, but it is difficult for technically inclined people. I suggest either trying to enter into a kind of meditated state to reduce logical activity, or exhaust your brain so it is so tired that it shuts down its logical analysis, because it is an expensive activity.

6. **Numbers:** An example of a nice pure closed linguistic cube is numbers. I suggest learning speaking 1, 2, and 3 digit random numbers as early as possible to find out the peculiarities of exactly your capacity to learn, such as speed of learning and forgetting, feeling of logic analysis interfering, efficiency: time vs progress.

7. **Listening skill:** Out of four language capabilities: Read, Write, Listen, and Speak, the most important is Listening. This is because all the other activities allow you to pause and think, but you cannot stop when listening to live speech.

8. **Translations:** Ties to other known or your native language must be minimal. It can be used only to understand the meaning of a foreign phrase. Never try remembering translations.

9. **Learn when sleeping:** The brain learns when it sleeps. Expect language skill improvements only after you sleep (even after several nights). Do not underestimate the value of doing exercises just before going to bed.

10. **Feedback reaction:** The brain learns only when it sees the effects in the outside world. This suggests that it is important to understand what a person says, why this person says what he says, and why the person says that in this particular way.

11. **Time of recollecting:** Take your time to recollect the correct word or phrase. The effort you make when repeating words and phrases is what actually counts. Because the brain starts the process of rewiring neurons when it really struggles.

12. **Rapid response:** The brain learns by creating neural connections when the reaction is required fast and there is no time for making complex search of the right information. Hence the speed is important. First achieve fluency in the topic you learn, and only then expand the cube.

13. **Thinking to phases, not words**: While doing exercises try not to think about the words that have to be spoken, but about the meaning of what has to be said. The words should appear unconsciously by magic.

14. **RUR and LUR:** Do Read-Understand-Repeat and Listen-Understand-Repeat exercises. If you try to do this in your native language, it is easy, so should be in the language you learn.

15. **No grammar:** Do not study grammar and never memorize translations. Memorize phrases spoken in context.

16. **No idle learning:** Do not read or listen without full understanding. It does not help much and it is not efficient. Just looking at a building does not make you a better architect.