![Amsterdam Center for Language and Communication — ACLC logo]

ACLC research focus (zwaartepunt): "Learnability"

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1. The learnability of human languages

A central question in linguistics is how children acquire the language of their parents.

Well, to some extent they don't. The language data that children hear is impoverished in at least three senses: (1) some crucial types of data may never appear in the child's input, (2) the data that does appear only gives superficial information about the structures that generated the data in the speaker's brain, and (3) the data wil contain "noise" as a result of errors or ellipses by the speaker and as a result of imperfections in the transmission channel. On the basis of such impoverished input children will construct their own private internal language.

When constructing their own language, the children will almost inevitably end up speaking somewhat differently from their parents. Such changes will not only be apparent in the histories of single languages, but even more dramatically in second language acquisition (where learners start with an already present language system rather than from scratch) and in language creation processes such as creolization (where no single mother tongue is available).

By evoking change, learnability problems lead to typological variations between languages. If the goal of linguistic theory is to explain what are possible languages and what are not (with the higher goal of explaining what makes us human), the consideration of learnability issues is therefore of primary importance. The following is a series of questions, sorted by partial causality, whose answers impinge on the question of 'possible language':

(1) What are possible ways to represent language in the brain?
(2) What are possible acquisition paths?
(3) What are possible language changes?
(4) What are possible language types?

By directly addressing questions (2) and (3), learnability should receive our central attention. This is why the ACLC has proposed learnability as its research focus (*zwaartepunt)* within the inter-faculty focus area Cognition.

2. Explanations for the learnability of human languages

There are several potential explanations for the learnability of a language:

A common explanation in innatist approaches is that a language is learnable because the human brain is capable of representing the grammar of that language.

A common explanation in functionalist approaches is that a language is learnable because it is functionally adequate.

A common explanation in emergentist approaches is that a language is learnable if there is a learning path leading from the initial state of the learner to that particular language.

These three types of explanation show that one can work on learnability and either be an innatist, a functionalist, or an emergentist. All three approaches form part of the research programme of ACLC, which thus offers an ideal research environment for the study of learnability.

Although this might suggest that one could do profitable learnability research and continue to be an innatist, a functionalist, or an emergentist, this appears not to be the case, as a little thought shows. In order for a language to be learnable, *all* three conditions just mentioned must be fulfilled:

- A hypothetical language might be functionally adequate, but if it cannot be represented in the human brain, the child will not end up speaking it.

- A hypothetical language might be representable in the human brain, but if there is no learning path for the child, the child will not end up speaking it.

- A hypothetical language might have a formally well-defined learning path, but if it breaks down in the interaction between the speakers, they will seek for different means of communication.

This means that a fully correct account of learnability will have to take into account all three conditions. Such comprehensiveness should be familiar to ACLC members: this is what we have been striving after since the inception of our *Language Blueprint*.

Learnability helps explain attested typologies of what occurs and does not occur in human languages. If a certain linguistic phenomenon is not learnable, it might still arise by chance in a community of speakers, but the next generation of speakers will do away with it, so that such a linguistic phenomenon will either be non-existent or rare in the world's languages. The language changes that learnability issues will cause over the generations may have a strong influence on attested typologies.

3. What kinds of ACLC research would fall in the rubric of "learnability"?

Learnability already makes contact to various strands of current research in ACLC. Apart from the three different perspectives on modelling learnability mentioned in 2, there are evident connections to research into first and second language acquisition, language creation, language change, and language variation. People working in these areas can be said to engage in learnability research if they address the issue of the transmission processes involved.

A perfect ACLC research project, though, would address all three perspectives, as argued in §2.

This can be illustrated with the example of a project that investigates a historical change. you would first have to model, on the basis of the attested data, how speakers before the change represent the language in their brains; this will yield an exact description of what the language looked like, even beyond the attested data. Next, you would have to model how children try to acquire this language. In order to be successful in this modelling, you would have to give an exact proposal of how the phenomena under investigation are represented in human brains, and of how learning proceeds. This involves modelling not just the representations and learning algorithms, but also the interactions of the child with multiple speakers. Next, you

would have to model the interaction of the grown-up learner with other speakers. With these steps, you would have modelled with some precision how the language is transmitted from one generation to the next. In order to model the full evolution of the language change at hand, this modelling may have to involve multiple generations.

Such an ideal comprehensive approach should be kept in mind when doing research that targets the ACLC research focus of learnability.

The ACLC proposed the research focus of learnability because it is and has been doing quite some research in this area already. The most obvious kind of work that counts as learnability work is computer simulations of acquisition paths, as in Diana Apoussidou's (2007) dissertation on the virtual acquisition of metrical phonology. Any explicitly modelled account of how children learn their language also counts as learnability work, for instance Maren Pannemann's (2007) dissertation on the acquisition of the Determiner Phrase.

Most closely linked to the general idea of learnability are the acquisition groups in the ACLC. However, research that is just descriptive would *not* count as learnability work. Often, of course, there is a theoretical model that the research is testing. For example, by investigating monolingual and bilingual learners with and without Specific Language Impairment, Antje Orgassa and Jan de Jong have been able to find evidence that SLI is due to a processing deficit rather than to a representational deficit. Likewise, Nomi Olsthoorn and Sible Andringa aim to test a model of first- and second-language proficiency that claims a distinction between "core" linguistic cognition and "peripheral" linguistic cognition, each of which comes with a different learning path that interacts differently with intellectual abilities.

Creolization is a very good example of learnability issues in one generation. There exists purely descriptive work, but usually the ACLC researchers interpret creolization in terms of a theoretical model of learnability. One of the authors of these lines is investigating the concept of 'transparent' (or 'WYSIWIG') languages, which have systematic one-to-one relations between meaning and form in the areas of syntax, morphology, and phonology. Such languages are rare but relatively frequent among creoles; the cause of this is sought in their similarity to certain stages in first- and second-language acquisition.

People working on language change do learnability work if they address the issue of transmission from one generation to the next: does the language change because of the child's acquisition process? In the project *Variation in Inflection* the cause of the diachronic loss of inflection, as can be seen in Dutch, is sought in an interaction of early and late acquisition.

Learnability can be modelled even in the sociolinguistic area. Speakers adapt their speech to their audience, and listeners adapt their comprehension to the speakers. Bart de Boer's upcoming PhD student will model a group of virtual speakers-listeners who develop communication systems; this will simulate at one stroke the cultural and biological evolution of speech. Such "agent-based" modelling typically accounts for emergent behaviour in groups, where each agent shows relatively simple individual behaviour (sheep form herds because every individual sheep wants to be in between three others).

Here we must stress a project does not have to address learnability in order to be a good ACLC project. This point is explained next.

4. Relation to the *Language Blueprint*

A project that addresses all four questions mentioned in §1 will often be an instance of a compehensive *Language Blueprint* project. Such a project will automatically address *processing* (acquisition), *change*, and *typology*, and if it also explicitly *models* learnability, it will thereby address all four pillars of the *Language Blueprint*.

We must note that, conversely, a project can address several pillars of the *Language Blueprint* without addressing learnability issues. Such a project would connect well to the research programme of the ACLC, but would not count as connecting to the research focus of learnability.

The advantage of a project proposal that connects to the research focus of learnability over a proposal that only connects to the *Language Blueprint* is that such a proposal may receive funding from the University's *zwaartepunt* funds.