The preservation of structure in language: the importance of having an editor

Madeline Meyers, Dan Yurovsky

Languages change with every generation of speakers—not only by acquiring new vocabulary, but also by adapting to the communicative needs of their users. One working theory is that languages evolve due to two dynamic competing pressures: one, for the language to be easily transmitted to new generations—and hence simple—and another, for the language to be a useful, descriptive form of communication—and hence more complex. The two experiments described attempt to understand how these pressures operate in a novel language. In the baseline task, 120 adult users on Amazon Mechanical Turk participated in an iterated learning experiment where they were told to re-create a randomly-generated dot grid pattern. Each users’ responses represented one generation of language learning, as their patterns became the training input for the subsequent user. Results show a linear reduction in three measures of complexity over 6 generations, illustrating a dramatic simplification in the languages. However, percent accuracy only increased for the first three generations, reflecting a tendency for adults to continue introducing errors into the novel language despite its simplification.

In a second version of this task, 240 adults on Amazon Mechanical Turk were assigned to be either a “learner” or a “fixer” within a generation. The learners completed the same task described above, while the fixers were tasked with fixing the errors on the learner’s pattern, in order to make it match a target image—the same target image seen by the learner. Results showed a slower decrease in complexity in this dyad task than in the previous baseline task—the fixers reintroduced complexity in the patterns. However, percent accuracy was similar for the combined learner and fixer combined data compared to the baseline condition. This illustrates that users were able to reach a similar level of accuracy while retaining a higher level of complexity in a novel language due to the presence of an editor. Therefore, by correcting other’s language errors as teachers, parents, or peers, not only do we help the individual we are correcting, but we are also helping the entire language system from changing into one which is oversimplified and unusable.

OLD ABSTRACT

Languages change with every generation of speakers—not only by acquiring new vocabulary, but also by adapting to the communicative needs of their users. One working theory is that languages evolve due to two dynamic competing pressures: one, for the language to be easily transmitted to new generations—and hence simple—and another, for the language to be a useful, descriptive form of communication—and hence more complex. The following study traces the effects of these pressures on a novel language as it is passed through generations of learners. In the first part of this study, 150 adults participated in an iterated learning experiment where they were tasked with re-creating a randomly-generated dot grid pattern. Each users’ responses represented one generation of language learning, as their patterns became the training input for the subsequent user. Results show a linear reduction in four measures of complexity over 6 generations, illustrating a simplification in the languages. The percent accuracy of users’ re-creations increased over the first few generations, showing an increase in transmissibility, but then asymptoted around the 3rd generation. This suggests that simplicity was not the only pressure on the language, in fact, descriptiveness continued to play a role. Therefore, adults seemed to be implicitly altering the language by introducing errors which balanced simplicity and communicability. Data collection for the same task is ongoing in children to understand how these pressures may differentially impact their language changes, as children may experience a greater pressure towards simplicity. Additionally, paired versions of the task, whereby alternating participants re-create and edit grids, are currently being run on adult-adult and child-adult dyads. These conditions aim to see how an editor may reintroduce complexity into the language—thereby playing a vital role in the retention of useful, complex language systems. In sum, current results show that over time, seemingly random languages adapt to become less-random—they are less complex and easier to reproduce—, simply by way of speakers’ unintentional errors.