Loan-Word Acquisition based on a Multi-Agent Model

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In this paper, we propose multi-agent models, where agents learn an accent rule in the community. The agent modifies his own rules through mutual communication. We focused our argument on a language evolution, or a language deversity in our research.

Chomsky's famous claim that all humans speak a single language, is surely plausible. However, in our view it is true that we have thousands of mutually unintelligible languages. Imagine you could speak with children whose grammar is not correct, or we could understand "dialect".

Charles Darwin stressed the importance of language difference and linked the evolution of languages to biology.

The study of communication/language from an alife perspective has received a great deal of attention . Some of the experiments were conducted by some researchers.

The simulation experiment by Werner and Dyer[6] successfully demonstrated the evolution of a system.

In their model, effective communication allowed males to find females more rapidly, and thus increased the reproductive rate of the individuals that communicated effectively. They showed that "dialects" that are bilingual (i.e., correctly interpret several signaling protocols) have an increased chance of dominating over a period of time.

Concerning the evolution of grammar, Ono[8] constructed a multi-agent model for a language acquisition. He presupposes that a child agent who has a primitive grammar set is thrown into the adult agent community. The child modifies his grammar and learns the refined one, imitating adult's sentences, while adult agents also loosen their grammar in order to accept what the child says tolerantly.

The scientists have no conclusive answer as to why this linguistic diversity exists. While the quest for the origin of diversity in languages is a challenging theme, diversity in species is also one of the most important themes.

We consider a monotonous accent phenomenon is one of dynamic language change. In this paper, we assume that Japanese agents learn an English word from a native speaker, or a television. And then, they use it in the community. The agents have two steps for learning English. First, they transform the English sound pattern into the Japanese sound pattern(i.e., to make "katakana"). To say concretely, the agent find out English syllable structure, like a vowel or a consonant. And then, because of the Japanese phonological constraint, they modify the structure to Japanese structure. Second, the agents give an accent to the structure. All agents have a following accent rule:

the loanword accent rule:

place the word accent at the third mora counting from a word ending.

We suggest an accent rule based on a character of a sound structure, and environment variable.

It is known that a word accent concerned with a syllable and a mora, and a phenomenon of a word accent monotonously happens that the words become familiar. In view of this, we might suggest a word learning process as follows:

1. an agent changes English syllable structure to Japanese mora structure.

2. an agent speaks to the other agents at random.

3. an agent evaluates their accent rule through communication.

We gave personalities to the agents. The experiment show that the Agent could learn loan word through conversations. And some agents are affected by mutual communication in the community. The agents get an accent rule, a word type, or a word frequency. And then, they change their accent rule because of the information of the other agents.

We constructed a language acquisition model of a communication system. It has been shown that the evolution of linguistic diversity.