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UNIDIRECTIONAL MEANING CHANGE WITH METAPHORIC AND METONYMIC INFERENCING

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Grammaticalization is an important factor in language evolution as it may contribute to the emergence and the evolution of grammatical forms (Heine & Kuteva, 2002; Hurford, 2003). Considering what kinds of dispositions in cognitive mechanism can induce grammaticalization is significant in studying the origin of language. Hashimoto and Nakatsuka (2006) showed that two designs of meaning structure, "pragmatic extension" and "cooccurrence", were effective to realize unidirectional meaning changes, the centric feature of grammaticalization, by constructing a computational model of grammaticalization. This model is made based on the iterated learning model of Kirby (2002), in which a speaker having a set of production rules utters descriptions of some situations composed of some elemental meanings to a hearer who tries to construct his/her own rule set. In this paper, we analyze the relationships of the two designs with metaphoric and metonymic inferencing, the important mechanisms for meaning change.

The design of meaning structure named "pragmatic extension" is the followings: the speaker can use forms F_2 and F_3 representing elemental meanings M_2 and M_3, respectively, in order to describe another elemental meaning M_1. For example, in order to describe a meaning of $\langle go \rangle$, the forms representing $\langle run \rangle$ and $\langle walk \rangle$ can be utilized. In our simulations, this setting boosts the frequency of meaning changes in which the source is $\langle go \rangle$ and the targets are the other meanings including but not limited to $\langle run \rangle$ and $\langle walk \rangle$. Note that all meaning changes have virtually the same frequencies without this setting.

Since the situational meaning is denoted as $\langle [tense] verb(agent, patient) \rangle$ in the model, $\langle go \rangle$, $\langle run \rangle$ and $\langle walk \rangle$ are in predefined paradigmatic relations. The current setting of "pragmatic extension" means that the speaker recognizes the relevance among specific meanings in the paradigmatic relations and $\langle go \rangle$ as the core of those meanings. The speaker applies a production rule $M_2 \rightarrow F_2$ to M_1 extensively based on the recognition of the relevance of M_2 to M_1. This process corresponds to the metaphoric inferencing in which expressions in a meaning domain are applied to another domain based on the relevance between the domains.

The design of meaning structure named "cooccurrence" is defined as follows: a combination of two elemental meanings M and M' is more frequent than the other combinations in the situations to be described. In our simulations, setting the "cooccurrence" of $\langle go \rangle$ and $\langle future \rangle$ makes the meaning change from the former to the latter more frequent than to the other meanings. Note that there is no selectivity in the target of meaning change without this setting.

The "cooccurrence" means that the hearer recognizes a relevance between specific meanings in a syntagmatic relationship, for the meanings $\langle verb \rangle$ and $\langle tense \rangle$ have a predefined syntagmatic relation in the model. It can be said that the meaning change from $\langle go \rangle$ to $\langle future \rangle$ based on the recognition of the syntagmatic relevance is induced by metonymic inferencing by the hearer.

In sum, we have showed that the core of some meanings having paradigmatic relevance, such as $\langle go \rangle$ in $\langle run \rangle$ and $\langle walk \rangle$, is the source of unidirectional meaning change and a meaning having syntagmatic relevance to the source is the target. It is suggested that the cognitive dispositions of language users make the unidirectionality possible: concretely, the speaker makes the metaphoric inferencing in which he/she recognizes a paradigmatic relevance and applies a rule extensively, and the hearer does the metonymic inferencing in which he/she shifts meanings based on the recognition of syntagmatic relevance.

We also found that two generalization learning mechanisms adopted in our model, respectively corresponding to reanalysis and analogy, are both related to metaphoric inferencing. In contrast, Hopper and Traugott (2003) insist that reanalysis is related to metonymic inferencing. While this difference between our and their results is interesting, the important common point is that speakers' metaphoric and hearers' metonymic inferencing contribute to grammaticalization.

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