

# A GAME THEORETIC ACCOUNT OF SEMANTIC SUBJECTIFICATION IN THE CULTURAL EVOLUTION OF LANGUAGES

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Linguistic research from the past decades has revealed a pathway in semantic change by which cultural transmission causes word meanings to become increasingly subjective, i.e. increasingly based in speakers' beliefs and attitudes (see Davidse, Vandelanotte & Cuyckens 2010 and the references therein).

A prototypical – but far from the only – case of subjectification is the rise of 'epistemic' meanings (1b) in 'deontic' modals (1a) (Traugott 1989).

- (1) a. *John must work hard to survive.* (*objective necessity*)  
b. *John looks tired. He must be working hard.* (*speaker's subjective certainty*)

While subjectification is often taken to reflect the need of speakers to express their inner selves, we consider this hypothesis as shallow and little informative. Instead, we propose an account in terms of evolutionary game theory and take subjectification to emerge through sender-receiver interactions where senders may attempt to manipulate receivers (e.g. by altering their construal of reality), while receivers may exploit signals for reading speakers' minds (i.e. beliefs, goals and intentions) (cf. Dawkins & Krebs 1984).

In our model, interlocutors may intend or interpret a message as either objective (about external reality) or subjective (about beliefs etc.). They may be cooperative or uncooperative (at a proportion that we fix *a priori* at  $q \in (0,1)$ ). Cooperative speakers are honest, uncooperative ones lie. Cooperative listeners are credulous, uncooperative ones disregard the encoded message, but try to infer hidden speaker beliefs.

The evolutionary dynamics of the populations of subjective and objective interlocutors are modeled as an asymmetric role game (Hofbauer & Sigmund 1998: 122ff.) with two positions (speaker and listener) and two strategies (subjective and objective), yielding four different behavior types (subjective speaking & subjective listening; objective speaking & subjective listening, etc.). This yields a 4-by-4 game with 16 different encounter types.

Payoffs resulting from pairwise speaker-hearer interactions are divided into four ordinal categories (no benefit/loss, small benefit/loss, medium benefit/loss, and large benefit/loss), which are numerized from 0 to  $\pm 3$ . Information about external reality is taken to be more valuable when true (and more harmful when false) than information about speakers' intentional states.

For each combination of cooperative or uncooperative individuals choosing one of the available strategies in one of the two positions the payoff is determined heuristically and weighted according to the assumed proportions of cooperative and defective players.

An analysis of the resulting dynamics reveals two qualitatively different evolutionary outcomes: if the proportion of cooperative players does not exceed a certain threshold ( $q < 1/\sqrt{2}$ ), the behaviour type 'objective speaking & subjective listening' represents the only evolutionarily stable strategy-combination. Otherwise, i.e. if the proportion of cooperative speakers is extraordinarily large, the replicator dynamics exhibit a cyclic behavior where speakers switch periodically from one strategy to the other, followed by subsequent periodic listener-strategy adaptations.

We take this to suggest that subjectification is driven by listener's interest in (potentially hidden) beliefs and intentions of speakers rather than by speakers' desire to express their inner selves. At the same time, our account shows that concepts developed in the study of animal communication can be productively applied in the study of language diachrony as well.

## References

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