HOMO REGULARIS: LANGUAGE AS A CULTURAL INVENTION OF THE RULE-OBSESSED SPECIES

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As is often pointed out, human beings are quite distinctive in their astonishing ability to find patterns and rules based on the observation of recurrent phenomena, static sequences and so forth. The ability is so peculiar that they can even *learn* rules that are only assumed to exist but actually do not (e.g., as seen in the result of so-called iterated learning experiments: Kirby & Hurford, 2002). Even more unique is, however, their extraordinary inclination to *obey* the rules they find: not only are they good at detecting recurrent patterns from observation and memorize them, but also enforcing themselves (and others) to follow the patterns, which is characterized as the norm psychology (e.g., Henrich, 2015).

In this sense, human beings can be called *Home regularis*, man of rules: they are unique species in that they can hardly help finding, learning, and obeying rules. This study explores the rule-obsessed nature of human beings and tries to describe the nature of human language as what Homo regularis evolved to have during the course of cultural evolution. Specifically, the "language of Homo regularis" view, the LHR view for short, assumes that 1) language acquisition in the course of ontological development especially concerning grammatical rules is based on the process of *rule generation*, as opposed to rule learning; 2) the basic mechanism of rule generation is *abductive reasoning*, or *abduction*, rather than induction, which is performed by forming possible hypotheses, namely rules, based on input data even if the data are sporadic; 3) the computational engine of rule generation is not a combinatorial operation of minimum units (e.g., words) such as Merge (e.g., Hauser, Chomsky, & Fitch, 2002), but exemplar-based *analogy*.

The best strategy to guess what linguistic rules as social conventions or *norms* are shared within a community would not be to simply generalize relevant input data, because rules are implicit and inputs are concrete while target structure, namely rules, are, or at least can be, abstract. This is a part of the so-called *poverty of stimulus* (POS) argument (e.g., Chomsky, 1980), and as a possible solution to the POS problem, this study assumes that rules are not learned through generalizing input data, but *generated* with the inference from input data. As described above, humans as Homo regularis have a strong tendency to *see* rules in recurrent

phenomena even when there are no such rules, which means what they usually do when they think they learn rules would actually be rule generation.

This assumption could reconcile the long-standing nature-nurture dispute of grammatical knowledge/ability. The LHR view presupposes an innate capacity to perform grammatical operation, for example, ordering linguistic units in a semantically consistent way, as evidenced by emergent grammatical patterns found in home signs (e.g., Goldin-Meadow & Feldman, 1977) and the emergence of a new language (e.g., Nicaraguan Sign Language). The view, however, puts more emphasis on the *inheritance* of grammatical conventions shared and maintained in a community throughout the history, so the self-generation of grammatical rules, which seems actually possible, is of second-hand importance. In the course of cultural evolution, humans can generate grammatical rules even when they think they do replicate what the former generation does, as shown in the so-called iterated learning experiments (e.g., Kirby, Cornish, & Smith, 2008). From this it follows that, under the LHR view, language evolution as a cultural evolution is considered to be the repeated process of rule-generation by *pseudo-learners*.

If the language acquisition process is best characterized as rule generation, what mechanism makes the process possible? The answer the LHR view provides to this question is *abductive reasoning*, or *abduction*, which enables us to build a hypothesis about a possible rule or cause generating a result, only based on the observation of the result. Rule-generation could also be equated with the process of *inductive learning* as in, for example, Kirby and Hurford (2002), but inductive process might need a lot more assumptions of learning mechanisms or algorithms than abductive reasoning. Although abduction as the basic mechanism of language acquisition is critically discussed by Chomsky (1968/2006), the objection could be refuted by combining the rule generation process discussed above and the so-called *norm psychology*. Humans are sensitive to others' behaviors and would-be rules behind them but great apes such as chimpanzees do not seem to be (e.g., Haun, Rekers, & Tomasello, 2014). Abductively constructed rules or hypotheses may, therefore, well be effectively rejected by observing others' actions and reactions, resulting in moderately homogeneous behavior and mildly different but largely common sets of generated rules.

If the abduction-based rule generation is the basic mechanism of human language acquisition, how can we construct specific rules based on observed data? Under the LHR view, the computation of rule generation is based on the operation of *exemplar-based analogy* (Cf. Skousen, Lonsdale, & Parkinson, 2002). This marks a stark contrast with the view presupposing as a computational engine of grammar a combinatorial operation such as Merge (e.g., Hauser et al., 2002). The LHR view considers that exemplar-based analogy is more *cost-effective* in the context of computational load than combinatorial operation, in that it does not need full segmentation and can avoid the possible risk of combinatorial explosion (see the supplementary material).

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