Linguistics 247
Homework 1

Linguistics 247, Roger Levy

Handed out 22 October 2014 – Due 29 October 2014

1. For the context presented in Figure 1A of Frank and Goodman (2012), compute $S(L_0)$ and $L(S(L_0))$ for that paper's model (the *Rational Speech-Act theory*—RSA) under a uniform referent prior $P(r_S)$, assuming the set of alternative utterances is `blue`, `green`, `circle`, `square`.

2. Consider a variant of their model in which the referent prior is incorporated into the L_0 level. For this model, the literal listener L_0's distribution $\tilde{w}_C$ over objects is determined by ruling out objects inconsistent with the literal meaning of w and renormalizing the prior over the remaining objects:

$$\tilde{w}_C(o) \propto \begin{cases} P(r_S) & \text{if } w(o) = \texttt{true} \\ 0 & \text{otherwise.} \end{cases}$$

   Compute $S(L_0)$ and $L(S(L_0))$ for this revised listener under the referent prior $P(\square) = 0.2$, $P(\bigcirc) = P(\square) = 0.4$.

3. Compute σ_0, ρ_1, σ_1, and ρ_2 of the iterated best-response (IBR) model of Jäger (2012) for the same context, under a uniform referent prior.

4. Compute σ_0 and ρ_1 for IBR under the prior $P(\square) = 0.2$, $P(\bigcirc) = P(\square) = 0.4$. What do you notice?

   Strikingly, what we see here is that the listener ρ_1 *never* takes $\square$ as the best possible response for *any* message. Furthermore, at this point there is no difference between the responses of `blue` versus `circle`, or between `green` versus `square`—both interpretations are categorically of $\bigcirc$ or $\square$ respectively. This implies that with this prior, the IBR model will never be able to recover the scalar implicature we see empirically in this dataset, which drives an association between `blue` (and also `square`) and $\square$.

References

Frank, M. C. and Goodman, N. D. (2012). Predicting pragmatic reasoning in language games. *Science*, 336(6084):998.

Jäger, G. (2012). Game theory in semantics and pragmatics. In Maienborn, C., Portner, P., and von Heusinger, K., editors, *Sematics: An International Handbook of Natural Language Meaning*, volume 3, pages 2487–2516. Berlin: de Gruyter.