All Reviewers: Many thanks for the insightful reviews. Please see our responses below (Rn refers to Reviewer n).

R1.1 Aim of the paper. We show that short-term pragmatics can optimize communication beyond long-term emergent habits, with ref.-games and SCII as two cases exemplifying this same core idea. While, recently, Tomlin et al. 2019 and Lazaridou et al. 2020 also consider pragmatics during training, they do not use two-sided adjustment for each specific test instance, thus neglecting potential improvements. As in the early literature on emergent communication, although the invoked settings are artificial, the findings may inspire similar attempts at modeling natural language phenomena.
(1) GameTable(-s) methods. Comparing to the numerous RSA/IBR frameworks, using habit consistency as a game theoretical payoff is a novelty, to the best of our knowledge. Recent work (Zaslavsky et al. 2020, Wang et al. 2019) formalized RSA from information and optimization theoretical viewpoints, but did not take game theoretical equilibria into consideration. Details: Object candidate set C is for a single instance. Equilibria are simply extracted from the table according to their game theoretical definition. GameTable only checks Pareto. GameTable-s checks Pareto first; only if there's no Pareto, it goes on to the following procedures. These two methods are compared on the same test instances. Line 166: It may occur that there is no equilibrium or there are multiple equilibria without Pareto/sequential solution. In this case, the agents randomly select their actions.
(2) Accuracy and compositionality metrics. Accuracy improvements may seem easily obtainable when assuming agents have perfect opponent models. However, note that agents cannot pre-negotiate any custom protocol. Rather, we make very mild assumptions: RSA / IBR / GameTable are all universally-known and widely used principles for achieving consensus. How much accuracy these methods can bring about is worth exploring and similar improvements in natural language may be possible. Besides, communication accuracy in StarCraft-II shows the practical relevance of such settings. Compositionality is an important metric and we may add the following to Sec. 4.4: Topological similarities (w.r.t. location and color features) rise by -0.013, 0.213, 0.030, 0.035, 0.029, 0.062, respectively for black, blue, green, cyan, red/magenta, yellow/white objects in the challenging test set when using GameTable-s instead of the baseline method.
(3) Starcraft-II. Indeed, we adapted the reasoning procedure to fit the setting, and we emphasize succinctness and robustness, rather than compositionality or consistency; however, note that these are as well important metrics of any communication system. Details: Line 294 means agents learn to emit informative messages in long-term training; for short-term tests, baselines and our methods are compared with the same drop probabilities. Line 301: Feature vectors do condition on observation-action, but observations themselves (e.g., allies' location and health) do not deviate much from the last time step; which is why feature vectors do the same. We will amend our paper to better explain the experiments.
R1.2 Message candidates proposal and tractability. Please refer to R2.2.
R1.3 Argmax for RSA final decision. Actually, we used this setting in the experiment, but it does not outperform IBR.
R1.4 Time scales (Lines 44-47, 84-86, 113, 138, 144). Gricean pragmatic maxims pertain to conscious rational and cooperative actions of humans.[1] According to Lewis et al. (2014), cached equilibria from repeated interactions on the pragmatic timescale give rise to changes on the developmental timescale. "Stateless" means the target and distractors remain the same for each short-term instance, in which agents' emergent parameters (P_{S_0} and P_{L_0}) can be seen as steady priors for (multi-round) pragmatic reasoning methods. P_{S_k} is the k-th level reasoning strategy in RSA/IBR.
R1.5 SampleL/ArgmaxL/IBR (Line 120, 147) Listeners are probabilistic in SampleL and deterministic in ArgmaxL; speakers are deterministic in both; indeed, ArgmaxL is better. In fact, Andreas & Klein (2016) corresponds to SampleL. For SampleL (0.5), speakers are deterministic (=IBR S1) and listeners probabilistic (=IBR L0, before reasoning starts).
R1.6 Typos / expressions / citations in Lines 35, 109, 168, 328 and Figure 3. Thanks, we will correct these.
R1.7 Reproducibility. We submitted the code as well as documentation to enable reproducibility.

R2.1 Natural senarios. We also noticed Lazaridou et al. (ACL 2020) posted after the NeurIPS submission, which we will cite. However, this paper focuses on insights that vary from theirs (see R1.1). Natural linguistic tasks are clearly our future direction and we have initial results on figurative language, but these may appear in another paper.
R2.2 Tractability. All pragmatic methods in Table 1 use the same message candidate set (i.e., 75% sub-sampling, "non-trivial"). This usually leads to a small message set size $|M_\cup|$, so the problem is tractable. We agree that investigating scalability to large $|M_\cup|$ is important, and the incremental pragmatics of Cohn-Gordon et al. (2018, 2019) are inspiring: similar to RSA, we can also apply GameTable(-s) in each time step in an *unrolling* procedure. Within each time step, our time complexity analysis still holds, which may make GameTable(-s) more tractable. Other ways to reduce $|M_\cup|$ are also possible, e.g., hierarchically classifying messages and applying pragmatics for each decision layer.
R2.3 AlexNets. They are used because the visual perception tasks here are relatively easy.

R3 Consistency with habits is important for realistic language scenarios, as humans typically prefer common words over obscure ones. Most discussions in Sec. 4.2 also hold for Sec. 4.3. We will add an appendix section on environments.

R4 Distinct AlexNets: Transformation from the output of one to another is highly non-linear. "Hierarchy depth" refers to the iteration rounds of "S thinks that L thinks that S thinks that L thinks that...".

[1] https://plato.stanford.edu/entries/pragmatics/