Successful coordination is due to a combination of possibilities, not a single one.

Whether I will get my package today is different from whether I will get my package because the postman received my note and different from whether the postman received my note.

Therefore, inference about whether I will receive my package is different from inference about whether the postman received my note.

This is a Kantian distinction between reason and result.

When coordinating, you are trying, not to achieve an intermediate mental change, but an end result (though the end result, in some cases, might be a mental change. This distinction can be illustrated quite clearly in the postman scenario).

Because of this, many causal pathways can often become indistinguishable.

There is a goal, which is an equivalence class of states.

There are intermediate goals, which are metaphorical paths along which the goal can be achieved.

At each intermediate state, there is a set of probabilities of state transitions.

Each state has a degree of closeness to the goal, which is equivalent to the probabilistic distance between the goal and the state in terms of state transitions.

State transitions, however, are not independent of each other, but are due to a number of higher-order hypotheses. In some cases (the ones we consider), these hypotheses correspond to the goal of the coordination partner.

Coordination is the act of achieving a goal through interaction.

When attempting to coordinate, we often attempt to infer the probability of successful coordination.

This probability of successful coordination is equivalent to the sum of the probabilities of the state-transition paths that lead to successful coordination.

The probabilities of these paths are determined, in part by their prior probabilities, which come from a variety of background knowledge about the world and about the particular environment, context, and coordination partner.

They are also determined by observations on the actions that the coordination partner takes, since actions are assumed to be efficient progress towards a goal, and therefore are reflective of such.

By using the actions of the coordination partner to infer the probabilities of their goals, we can also infer their probability of successful coordination.

Importantly, we care only about the end result, and not about the path and the partner’s reasons or goals, therefore, we sum over all partner goals consistent with our goals.

Because of this, we can define a coordination opportunity as occurring when the equivalence class defining our goals intersects with the equivalence class defining the goals of another agent.

If both agents are able to achieve their goals, then coordination was successful.

If the actions are the other agent’s, then you make inferences about his goal. If they are yours, then he makes inferences about your goal. If the goals have an intersection, this intersection might be observed and tended towards by each agent, yielding coordination. If the goals are contradictory, then both agents will try to maximize their own goals. Cooperation vs. antagonism emerges automatically from the goal structures of the agents.

The optimality and goal structures are captured quite well by game theory, which defines normative behavior given perfect knowledge. However, the games are always partially hidden, and therefore there is a large component of the game that is often thought of as inferring the goals of the other player or the thoughts of the other player.

We aim to provide a theory that plugs into game theory in this location, but that does not explicitly consider goal inference as much as inference about final behavior. This final behavior, though it may come from inference on goals, is the more important quality, since the goal is to reach your own goal, independently of the mental states and goals of the other agents.