Dynamic persuasion ☆

Takakazu Honryo

Department of Economics, Doshisha University, Japan

Abstract

This paper constructs a model of dynamic persuasion. A sender attempts to persuade a decision maker (DM) by sequentially revealing verifiable arguments, but this incurs communication costs. In equilibrium, the sender decides when to give up, and the DM decides when to make a decision. We characterize the DM-optimal equilibrium. We further show that the DM gains from making a stochastic commitment, and provide a condition under which it also makes the sender better-off.
© 2018 Elsevier Inc. All rights reserved.

1. Introduction

Persuasion refers to the act of influencing someone to undertake a particular action. Successful persuasion is time-consuming and costly for both parties: the speaker attempts to present convincing arguments or information and, in turn, the listener either reflects upon or inspects them carefully. A typical process of persuasion may involve a back-and-forth interaction in which

the speaker gradually presents a series of arguments until the moment that the listener is either sufficiently convinced by the speaker or has decided that the speaker's case lacks merit.

For example, consider an entrepreneur who is attempting to convince a venture capitalist (VC) to invest in his startup. The VC wants to invest only if the startup is sufficiently likely to succeed. The onus is on the entrepreneur to explain and validate various aspects of the project that justify investment. Of course, the VC will scrutinize each argument, possibly hiring third parties to do so. In a stylized fashion, the process may unfold as follows: the entrepreneur presents a set of facts about the project that the VC scrutinizes and the VC then decides whether to invest, walk away, or request further explanation. The process is repeated, with the entrepreneur deciding whether to comply or to abandon the attempt to persuade the VC. This dynamic process of persuasion is pervasive, for example, in many buyer-seller relationships, in the drug-approval process, in international conflicts that involve periods of endurance (war and sanctions).

In this study, we construct a dynamic model in which the sender tries to persuade a decision maker (DM) to accept his proposal.[1] The merit of the proposal depends on how many favorable arguments the sender is endowed with, which is his private information. In each period, the players may be involved in a costly communication process in which the sender presents a favorable argument to the DM. In each period, the DM may either make a decision or require the sender to present more arguments, and the sender may give up. This is a game of communication through verifiable messages, in which the number of favorable arguments the sender is endowed (an integer) identifies the "sender type."

A perfect Bayesian equilibrium (PBE) determines a cutoff number of favorable arguments that the sender must present to obtain the DM's sure approval. This cutoff number partitions the set of sender types into two subsets: high types and low types. The DM gradually updates her belief about the sender type, which will enable her to make an accurate decision. She may accept the proposal at an early stage with a positive probability, knowing that her decision might be wrong. A high type sender will continue to persuade the DM until his proposal is eventually approved; however, a low type sender gradually gives up. It is also possible that ex-post, the sender could be successful in persuading the DM, but still pay too much in communication costs and lose.

We characterize the equilibrium that maximizes the DM's ex-ante expected payoff (i.e., the DM-optimal equilibrium).[2] We show that, among all equilibria, the DM-optimal equilibrium features the largest cutoff number, because such an equilibrium screens out low types efficiently. We further show that in the DM-optimal equilibrium, among low types, the lower the sender type, the more persistent the sender becomes in presenting arguments. This is because the equilibrium construction requires sequential screening of low types; before the terminal period, a sufficient mass of low types must survive and drop out sequentially, to incentivize the DM to continue. Given that the loss from approving the proposal is negatively correlated with the sender type, the lower the sender type, the smaller the necessary survival rate. Thus, an equilibrium in which lower types tend to survive longer has a smaller expected communication cost for the DM. We provide a condition under which we can fully leverage this observation and the DM-optimal equilibrium takes a very simple form; the distribution of the sender types in each period after period 2 is a truncation of the distribution that is formed in period 1.

Due to the sequential rationality of the DM, equilibrium must induce some outcomes that incur loss for the DM. She can eliminate these by committing to listen. We show that the optimal

---

[1] Throughout, we use female pronouns for the DM and male pronouns for the sender.

[2] We also characterize the sender's best equilibrium.