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Cooperation, Coordination and Competition: Theory and Experiments.
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Summary in English

Understanding cooperation, coordination and competition is among the biggest challenges in our society. This thesis explores how cooperation, coordination and competition are influenced by communication and population structure. This thesis present the results of three independent studies that all make use of laboratory experiments.

In Chapter 2 we investigate why face-to-face communication induces cooperation in social dilemmas. We conduct a series of experiments to disentangle the effect of three mechanisms: social identification, type detection and commitment value. Subjects in all treatments play a one-shot prisoner's dilemma game. We manipulate their opportunity to communication before making decisions: In No communication, subjects meet in silence only after making their decisions. In Silent communication, subjects meet in silence before making their decisions. In Restricted communication, subjects can talk without making a promise before making their decisions. In Unrestricted communication, subjects can talk freely before making their decisions. The idea here is that by increasing the degree of communication from No communication to Unrestricted communication, we are able to investigate how much each of the three factors contributes to the effect of communication.

The experimental results show that communication substantially increases cooperation from No communication to Unrestricted communication. However, Silent communication only slightly increases the cooperation rate compared to No communication, and the difference is not significant. The cooperation rate in Restricted communication is significantly higher than No communication, but falls well below Unrestricted communication. We control for the beliefs reported by subjects both before and after they communicate. We find that type detection and commitment value plays an important role in explaining the communication gap, whereas there is no evidence for social identification. This result departs from the literature, as it first decomposes the relative importance of each factor. It suggests the importance of type detection in other settings.

In Chapter 3 we investigate when and why pre-play sequential communication improves coordination in coordination games with conflicting interests. In the game-theoretic model, players can send messages in turn before making decisions in the coordination games. Players bear a small cost for each message in the conversation. We show that in the battle of the sexes game, in equilibrium communication always induces complete coordination. In chicken games, by contrast, communication fails to affect coordination or efficiency. According to the theory, the reason is that in the battle of the sexes game, players rather agree on the equilibrium that is most preferred by the other player than having no agreement. In chicken games, players prefer to play the mixed strategy equilibrium without agreement rather than to agree on the equilibrium most preferred by the other player.

We conduct experiments on mixed motive games in which we vary the size of the "disagreement" payoffs across treatments. One of the three games is the battle of the sexes and the other two are chickens games. Subjects play one of the three games both with and without pre-play sequential communication. In agreement with the theory, we find that communication is very effective in the battle of the sexes, but not at all in the chicken variations. Moreover, the first senders have a big advantage; they are three times as likely to achieve their preferred outcomes as the second senders. In chicken games, messages are much less credible than in the battle of the sexes. The model predicts that without communication, increasing the "disagreement" payoffs always makes subjects better off. By contrast, with the option to communicate, increasing the "disagreement" payoffs can make subjects worse off on average, as it makes communication ineffective. This prediction is supported by the experimental data.

Finally, Chapter 4 explores the sources of majority-minority inequality in cooperative and competitive environments. We use a game-theoretic model to capture individual decisions in how to allocate time between investing different skills. These skills are used differently depending on the role of the opponent in social interactions. In the competitive environment, the skills are used to compete against the opponent. In the cooperative environment, the skills are used to cooperate with the opponent. An interesting feature of this model is that members of the minority group enjoy a higher

surplus in the competitive situation but a lower surplus in the cooperative situation. These results are endogenously driven by the asymmetry of the population structure.

The experiment implements the model in a straightforward manner. In a 2x2 design, one dimension concerns the environment, which is competitive or cooperative, and the other dimension concerns the relative size of the two groups. To a large extent, the experimental results agree with the predictions of the model. That is, members of the minority group earn more in competitive environments compared to members of the majority group, but the reverse holds in cooperative environments. Besides, when the size gap of the two groups is bigger, the payoff difference also increases. The intuition is that subjects invest more toward the majority group and this leads to a minority advantage in the competitive situation but a minority disadvantage in the cooperative situation. When the relative size of the two groups is enhanced, this advantage or disadvantage is further increased.

To sum up, this thesis demonstrates that communication (Chapter 2 and 3) and population structure (Chapter 4) has a fundamental influence on how people cooperate, coordinate or compete with each other.