

(For JSPS Fellow)

Form B-5

Date (日付)

08/02/2018 (Date/Month/Year: 日/月/年)

Activity Report -Science Dialogue Program-
(サイエンス・ダイアログ事業 実施報告書)

- Fellow's name (講師氏名): Jozef Genzor (ID No. P17750)

- Participating school (学校名): Hiroshima Prefectural Hiroshima Kokutaiji High School (Hiroshima city)

- Date (実施日時): 23/01/2018 (Date/Month/Year: 日/月/年)

- Lecture title (講演題目): Collective Behavior of Large Systems

大規模システムの集会的挙動

- Lecture summary (講演概要): Please summary your lecture 200-500 words.

To understand the collective behavior of systems composed of many interacting pieces can be a challenging task. Even knowing the underlying laws of the interactions between the individual pieces does not guarantee that we can predict the properties of the studied system as a whole. The application of the known laws might lead to equations which are too difficult to be solved. It is often necessary to use randomized simulation (called Monte Carlo method), or other sophisticated numerical approximations.

I provided the students with the basic intuition behind the collective behavior of many-body systems in the case of social systems. Social systems are composed of people (individuals, also sometimes called as agents), who interact/communicate with one another. These interactions influence the people engaged in them, and after many interactions, global properties such as the behavior of groups or whole societies develop. An essential question is how these local interactions lead to the global properties of the system. This is a question that can be answered by tools of statistical physics, and the approach of statistical physics is used extensively in the study of collective phenomena.

Major regularities can appear in social systems even without external influence, as it is often seen in the real world. This can be understood as a transition from an ordered state into a disordered state. Typical examples of such transitions are the spontaneous formation of common language/culture, or the appearance of consensus on an issue, collective motion, a hierarchy. The drive toward the order is the tendency of agents to become alike as they interact. The term for this mechanism is the social influence, and it is analogous to ferromagnetic interaction in magnets.

We explored the Axelrod model, which is a model of cultural assimilation and diversity. In the Axelrod model, the communication reduces differences among the people, and the probability of communication depends on the similarity between two agents. It might seem that this mechanism leads to homogenization of society. However, it can generate global polarization, where different cultures coexist. The mechanism of this model might be relevant for such topics as state formation, succession conflicts, or transnational integration.

- Language used (使用言語): English _____

- Lecture format (講演形式):

◆Lecture time (講演時間) 70 min (分), Q&A time (質疑応答時間) 15 min (分)

◆Lecture style (ex.: used projector, conducted experiments)

(講演方法 (例: プロジェクター使用による講演、実験・実習の有無など))

Used projector

◆Interpretation (ex.: assistance by accompanied person, provided Japanese explanation by yourself) (通訳 (例: 同行者によるサポート、講師本人による日本語説明))

Assistance by accompanying person

◆Name and title of accompanied person (同行者 職・氏名)

Yoshinori Sasagawa

◆Other note worthy information (その他特筆すべき事項):

- Impressions and opinions from accompanied person (同行者の方から、本事業に対する意見・感想等がありましたら、お願いいたします。):

講演は生徒たちの知的好奇心を刺激する良い内容だったことが、質問の多さから見て取れました。また、本プログラムは生徒だけでなく講師にとっても素晴らしい経験ができる良い企画だと思います。

Because there were a lot of questions from students, I am sure that your lecture was enough to stimulate their intellectual curiosity. The science dialog project is not only good for students but also good for us. We were able to have a precious experience.