

様式 A-1

(FY2023)

2023年 12月 1日

サイエンス・ダイアログ 実施報告書

1. 学校名・実施責任者氏名: 山梨県立甲府第一高等学校・森岡博美
2. 講師氏名: Dr. CROSSCOMBE Michael
3. 講義補助者氏名: 馬場 涼音 様
4. 実施日時: 2023年 12月 1日 (金) 13:20 ~ 15:15
5. 参加生徒: 1 年生 53 人、 2 年生 55 人、 3 年生 0 人 (合計 108 人)
備考: 探究科の生徒
6. 講義題目: Collective Intelligence and Artifical Life (人工生命)
7. 講義概要: 1・導入 (自己紹介) 2・過去の研究 (群知能) 3・人工生命についての導入 4・進行中の研究 (集団的知性)
8. 講義形式:
☒ 対面 ・ ☐ オンライン (どちらか選択ください。)
1) 講義時間 90 分 質疑応答時間 15 分
2) 講義方法 (例: プロジェクター使用による講義、実験・実習の有無など)
プロジェクター使用による講義。
3) 事前学習
☒ 有 ・ ☐ 無 (どちらかに○をしてください。)
使用教材 講師作成の資料 (パワーポイント)
9. その他特筆すべき事項:
特にありません。

Form B-2
(FY2023)
Must be typed

Date (日付)
2023/12/04 (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): Michael Crosscombe (ID No. P23072)

- Name and title of the accompanying person (講義補助者の職・氏名)

修士課程 馬場涼音

- Participating school (学校名): Yamanashi Prefectural Kofu First High School

- Date (実施日時): 2023/12/01 (Date/Month/Year: 日/月/年)

- Lecture title (講義題目):

Collective Intelligence and Artificial Life

- Lecture format (講義形式):

◆☒ Onsite ▪ ☐ Online (Please choose one.)(対面 ▪ オンライン)((どちらか選択ください。))

◆Lecture time (講義時間) 90 min (分), Q&A time (質疑応答時間) 20 min (分)

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

(講義方法 (例: プロジェクター使用による講義、実験・実習の有無など))

プロジェクタ

- Lecture summary (講義概要): Please summarize your lecture within 200-500 words.

In this lecture I introduced my academic journey from school up to my arrival in Japan to begin my JSPS fellowship. I described how I studied computer science and then went on to complete a PhD, after which I began looking for an alternative research field. I then discovered Artificial Life whilst attending a workshop in Japan. During my background, I introduced one of the biggest research projects of my PhD which included conducting experiments using 400 Kilobot robots to study a model that was inspired by biological swarms, such as honey bees. After walking through this research, I took questions at the end of the first hour.

In the second half of the lecture, I gave a very brief introduction to Artificial Life research, and why I think Artificial Life is an exciting field of research. I introduced the evolution of Cellular Automata research starting from their introduction in the 1940s through to modern-day continuous cellular automata such as Lenia, and how these systems are becoming increasingly life-like. Artificial Life provides us with an alternative paradigm for studying the origins of life, of collectives, of interactions and emergent behaviours, outside of the existing forms of life on earth (i.e., biological life). I

argued that artificial life can help us to better understand biological life, as it exists on earth and perhaps in the wider universe, while also separating fundamental questions such as "What is Life?" from existing examples. Finally, I introduced Collective Intelligence as my particular topic of interest, and explained why I believe that Collective Intelligence is the most exciting field of research for our time, because most forms of intelligence appear to be the emergent property of an underlying collective, and therefore we cannot hope to understanding intelligent behaviours without first understanding the interactions of the underlying systems.

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

I wish I had more time to discuss and learn about the school, its special research programme that the students were undertaking, and whether there were future opportunities to be involved in helping out with that course. It sounds like the students are given an amazing opportunity for curiosity-driven learning and exploration, and I would love to learn more about how the school is fostering that kind of creative approach.

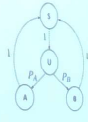
Given the nature of their learning, it might have been more useful if I had asked more about the programme and how I could have structured my lecture better to give them some more useful information.

- Impressions and comments from the accompanying person (講義補助者の方から、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。):

今回の講義の目的は、研究内容や経歴について英語で聞くという経験を通じ「生徒たちに大きな刺激を与え、研究への関心や国際理解を深めること」とあるが、この目的達成のためには生徒たちの英語力や関心について事前に情報があると良かったと思う。およそ2時間の講義が冗長で難解なものではなく興味深いものになるよう、講師も資料に工夫をし作成に多くの時間を割くので、お互いにとって良い講義になるように改善の余地はあると思う。

Best-of-n problem

We investigate robustness for the 'best-of-n' problem (Valentin et al. 2017), where robots are attempting to choose between $n=2$ options A and B, e.g., potential nesting sites in honey bees.



State transition diagram

3 Signaling state (e.g., waggle dance)
U Updating state

$A: x_A = 5$ $B: x_B = 7$

A and B are decision states, which are then signaled for x_A or x_B time steps, depending on the signaling agent's choice.