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Journalist in Residence (JIR) Programme in Mathematics in Japan

Koji Fujiwara

1. What is JIR?

We have lots of benefits from science and technology, and the modern society cannot continue without that. Even some of the very abstract theories in mathematics and physics find application in the daily life. For example, theory of elliptic curves is used for cryptography and GPS needs general relativity to correctly work. Some of them are directly related to our safety and health. Genetic engineering is becoming more and more common. We have to worry about the radiation problem after the incident in Fukushima and lots of researches are going on but opinions differ even among specialists such as physicists, statisticians and doctors. Advanced medical technologies raise ethical issues for us to discuss. "Big science" such as space science, accelerators, genome projects and super computers spend lots of money (tax) and not only researchers but also many other people are involved. Science and technology are not something we can just use, but we may want to know about that enough to form our own opinions.

So, we need good science writers. But it is not so easy to produce them because one has to be a good writer, and at the same time he/she needs to know advanced science and technology to write about the cutting edge research. But as far as I know there are nearly no programmes of science writings in Japanese universities. That is the reason why I started the programme "Journalist in Residence" (JIR). I wanted to make a small change from mathematics. By this programme, journalists and writers, who already have lots of experience in writing, stay at mathematics departments hosting them for a few weeks. They talk to mathematicians, visitors, students, administrators and librarians, and also attend conferences and seminars. Since they are away from their own jobs, each department pays for accommodations, a small per diem and an office. They are not obliged to write for the department or the programme. It is simply an opportunity for them to stay, or "reside", at a department of mathematics, explore and get to know about mathematics and mathematicians. I am also hoping that having journalists around in the department will create an interaction between the journalists and our students, and that some of them might get interested in science writing.

The idea of JIR is not my original one. MSRI in Berkeley, California ran a similar programme from 1998 to 2005. The difference is that their programme had people staying for one semester. As far as I know, our JIR is the first such programme in Japan in any discipline.

I started the programme 4 years ago. I talked to Professor Takashi Tsuboi at the University of Tokyo, who was the president of the Mathematical Society of Japan (MSJ) at that moment. He encouraged me and suggested to start the programme right away. We had a press interview about the launch of the programme and the applications to the programme are handled by MSJ since then. So far more than 10 departments of mathematics, institutions and research groups related to mathematics, have joined the programme, and more than 20 people have attended the programme. Typically each person stays for a week or two at one or two places. There is a lot of variety in the background of the participating journalists, science writers, photographers, science magazine editors, cartoonist, TV programme directors, and science translators. Some of the host departments have grants from "Global centre of excellence" programme in mathematics by Japanese Society of promotion of Science (JSPS) and JIR is a part of the projects they run by that grant.

2. Mathematics in the Japanese Society

People in Japan have a strong interest in mathematics. For example, "The Housekeeper and the Professor", a popular novel by Yoko Ogawa about a mathematician who only has a short memory after a car accident, was made into a film and a TV drama and it was a big success. Sudoku puzzles got many fans in Japan before it spreads to other countries. We have a few

monthly mathematics magazines for non mathematicians and you can find them at any big bookstores in the town. Typical readers are high school teachers of mathematics, undergraduate students interested in mathematics, and ordinary people who have an interest in mathematics as a hobby. I heard that many retired people buy the magazines regularly too. Most of the articles in those magazines are written by mathematicians and some of them are pretty advanced, for example, on complex analysis, group theory, algebraic topology and mathematics finance, etc. There are quite a few "popular science" books and many of them are on mathematics and physics.

On the other hand, mathematics is not one of the most popular subjects as majors at universities. It is slowly getting less popular than 30 years ago, when I was a high school student. The situation is better than Physics. I heard that only 20–30% of high school students learn Physics these days in Japan. Nearly all of the students majoring in mathematics at Kyoto University are men. When I was a student, best students tend to major in Law or Medicine. But probably students' interest is also changing, at least regarding Law majors, and they are more interested in business, internet technology and interdisciplinary studies, although Medical schools are still most popular among good students.

Recently, the Japanese government is trying to attract more young people to Science and Engineering, in particular more female students. It seems that they started thinking that science and technology is a key to boost the Japanese economy (also remember that IMF published a report "Can women save Japan?" last year). They encourage universities and professors to organise activities for public: many universities have "open campus" days and high school students visit laboratories or attend talks. Professors visit nearby schools and explain their research. I have done that several times and it was a fun for me too. They also funded a few universities for five years to run a course for science writing. As far as I know those are the first such programmes in Japan.

3. Record of JIR 2010–2013

List of 13 host institutions:

Tohoku University (Mathematics; AIMR), the University of Tokyo (Mathematical sciences, Lab of Aihara for mathematics, life sciences and informatics), Tokyo Institute of Technology (Mathematics and computer science), Meiji University (Mathematics), Keio University (Mathematics), Institute of Statistical Mathematics, Riken Brain Science Institute (Lab of Amari), Nagoya University (Mathematics), Kyoto University (Mathematics; RIMS), Kyushu University (Mathematics).

List of 20 participants from journalists:

2010: Masahito Kasuga, Director of science programme for NHK (Japan Broadcasting Corporation); Seiji Hasegawa, Senior science reporter for *Yomiuri Shinbun* newspaper; Eiichi Asami, Science reporter for *Kyodo Tsushin* press; Akemi Satoda, Reporter for *Chugoku Shinbun* newspaper; Yoshiko Miwa, Writer; Yoshitaka Arafune, Writer; Yuka Kamiya, Writer; Hideaki Takamori, Science and technology writer.

2011: Akemi Satoda, Yoshiko Miwa, Masahito Kasuga, Yoshitaka Arafune, Seiji Hasegawa, Satoshi Tomita (Science book editor for *Edit*).

2012: Kunie Suzuki, Book editor for *Keiso Shobo*; Hoshi Tominaga, Translator for popular science books; Naoyuki Uchimura, Science writer; Aya Furuta, Chief editor for *Nikkei Science* magazine; Seiji Hasegawa; Tetsujiro Kamei, Editor of books in mathematics; Hiroaki Kono, Photographer and photojournalist; Masahito Kasuga; Hayano Kobayashi, Science cartoonist; Yoshiko Miwa; Kenneth Chang, Science reporter for *New York Times*.

2013: Shigeyuki Koide, Science writer, President of Japanese Association of Science and Technology Journalists; Tetsujiro Kamei; Hiroaki Kono; Akemi Satoda; Tamiko Nakamura, Lawyer; Kazuyuki Harada, Reporter for *Yomiuri Shinbun*.

Photo exhibition at Kyoto University in March 2013, Photographer Hiroaki Kono (left) and Science editor Tetsujiro Kamei (right)

Some comments are in order. Out of 20 participants, 15 of them have studied science or engineering in undergraduate or graduate schools. This statistics can be misleading. Among writers and journalists in Japan, only a small portion of them, maybe less than 20%, have a science background in university education. Among science writers, maybe more than half of them have a science background. *Yomiuri Shinbun* is one of the biggest newspaper companies in Japan, which sells nearly 10 millions copies every day. The science section (independent from medical section) has 20 reporters or so, which is one of the largest in the world. Seiji Hasegawa is the chief of the section. Masahito Kasuga made a 90 minutes documentary programme for NHK on the solution of the Poincaré conjecture (before he attended the programme). Hoshi Tominaga translated more than 10 popular books in mathematics from English into Japanese, including "The Mathematician's Brain" by D Ruelle and "The Music of the Primes" by M Sautoy.

I work for the department of mathematics of Kyoto University. Our department and RIMS (Research institute for mathematical sciences) hosted 7 participants in 2012. One new challenge was that the programme had the first oversea participant. Kenneth Chang, a science writer for *New York Times*, spent two weeks. After the programme he says "My two weeks as a journalist-in-residence at the Kyoto University were certainly the most intellectually intensive vacation I've ever had, and it was a lot of fun, too. Hopefully, it will also lead me to write better newspaper articles about mathematics than I would have otherwise."

4. Workshops and Events Related to JIR

There are some activities and events related to the programme. Professor Takashi Tsuboi at the University of Tokyo organised three workshops for the participants and the host professors of the JIR programme to share experiences and ideas to each other. I have attended it two times and it has been very useful and enjoyable.

The MSJ have semi-annual meetings for its members. The MSJ has more than 5000 members, and many of them attend the meetings. The last one took place at Kyoto University in March 2013. Taking advantage of being at the host university, I organised a panel discussion and an exhibition on JIR. We got 9 panelists from the programme and more than 100 people came to listen. The discussion lasted for 90 minutes. In the exhibition, we presented more than 150 photos by Hiroaki Kono, cartoons by Hayano Kobayashi, and popular books in mathematics translated by Hoshi Tominaga. We had more than 300 people dropping by during the two days.

Panel discussion held at Kyoto University in March 2013

I record some opinions from programme participants at the panel discussion: "After I attend the programme, I had a chance to write about the papers by Professor Shinichi Mochizuki on the ABC conjecture. I got lots of help from the professors I met through the programme". "I'm translating popular books in mathematics from English. I majored in Mathematics for my undergraduate study but I need more knowledge in mathematics for my work. Talking to mathematicians and attending research seminars in mathematics has been very helpful." "I studied mathematics in my undergraduate and became a newspaper reporter. Mathematical or logical thinking is very important for good writing. I'm most interested in the interface between mathematics and society." "The most important aspect of the programme is that it is not seeking for a return in a short time." "I made a TV programme on the Poincaré conjecture. BBC had made a programme on the Fermat last theorem, which was highly appreciated internationally. That programme focuses on people including Andrew Wiles, but I wanted my programme to be not only about people but also about mathematics itself. After I attended the programme, I feel I can make more programmes on mathematics." "UK has a long and good tradition for communicating science to public, for example, Royal institution Christmas lectures and Simonyi professorship at University of Oxford. It is very important to have a lot of diversity in supporting core research."

Opinions by host professors: "When I first heard about the programme, I could not have a clear idea on what it is like. We have already been doing some events to communicate mathematics to public, but after hosting JIR, the difference is that we get a feedback

from the participants and know what we look like to them." "There is a huge gap between mathematicians and general public, and it is not easy to fill the gap, but that makes it more interesting and challenging. We really appreciate the programme participants who try to do that, and what's important for mathematicians is to welcome them and show the 'real thing' in mathematics."

5. Summary and Future Directions

The programme has been well received both by the host institutions and the participants. Most mathematicians are very enthusiastic to talk about their research for hours. I heard from the participants that some are easier to understand than others and I am curious to know what makes the difference. There might be a hint for us to learn for better communication. In general, it is still true that research of mathematics is so abstract that listening to them for a few hours is in many times simply not enough for the journalists and the writers to digest the contents. As I wrote, many of our participants have a science background from university study and lots of experience of science writing. Some of them suggested after the programme that it might be helpful if a crash course of the summary of university level mathematics (for example, manifolds, homology, set theory, groups, basic number theory, complex analysis and functional analysis, etc.) is available before they start the programme. That could be useful to fill the gap between their experience and knowledge and the research mathematics.

There have been quite a few articles on the programme by the participants in a newspaper, magazines in mathematics and newsletters of the host institutions. Some of the articles in the newspapers on recent major achievement in mathematics, for example, on the ABC conjecture and the twin prime conjecture, are written by our programme participants. I believe our programme is increasing the supporters of mathematics.

I am going to continue the programme for some more years in the same style. I also want to try a few new things. One is that to make the programme more international, having more foreign participants and sending some of the programme participants to visit foreign institutes of mathematics. Another is to have more students involved in the programme. In the long run it would be very important to have science writers who have a strong education in Science. Also I feel it is time to communicate our experience and ideas to mathematicians, researchers in other fields and general public who are interested in mathematics.

A major part of the programme in the first three years has been supported by the GCOE programme by JSPS, but it is over. Since this year the host institutions are using their own fund. It is important for me to find a new funding. The programme will be partly supported for two years by *Suuri Kagaku Shinkoukai*, a foundation to promote mathematical science whose president is Professor Heisuke Hironaka (a Fields medalist).

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He received a Geometry Prize from MSJ in 2005 for his work in geometric group theory, and a Commendation for Science and Technology by the Minister of Education, Culture, Sports, Science and Technology in 2013 for the JIR programme.