CN Yang Scholars' Interactive discussion with Nobel Laureate Prof Chen-Ning Yang, 23 June 2014

by Erickson Tjoa CN Yang Scholar, NTU



(Front row from left) Yap Jian Beng, Ng Chyi Huey, Eu Shu Tian, Prof CN Yang, Lee Bei Shi, Lim Min, Lionel Ho Jia Xuen, Tan Young Kiat Zenn; Second row from left: Lee Kelvin, See Soo Teck, Li Junru, Yang Yi, Jin Wei, Duong Nghiep Khoan, Erickson Tjoa, Smrithi Keerthivarman, Tong Ka Wai.

e had the good fortune to join in an informal interactive discussion with the distinguished professor of Physics who won the Nobel Prize in 1957, Prof Chen-Ning Yang (CN Yang).

The discussion began with Prof Yang's response to, how he chose his supervisor and the problem to work on at the beginning of his career. His journey began with guidance from his mathematically-trained father, and with some good teachers in his Chinese university, then went for graduate studies in the US. He mentioned that both luck and ability played an important role in his journey. He was a theorist graduate student, so back then, his ability was prized in his group (who are mostly experimentalists, as he wanted originally to do experimental thesis). His supervisor (Edward Teller), whom he was introduced to by Enrico Fermi, managed



Prof CN Yang engaging in a lively discussion with the scholars.

to push him towards the theoretical path due to their earlier work together. He wanted to work with the biggest names of the day, but his supervisor who eventually became famous helped him to reach where he is today.

Regarding how one can choose his supervisors, he strongly emphasised the fact that there are two groups of supervisors and students: supervisors who want you to be very independent and exploratory (seen in the American system), or those who would give you much advice and guidance (as in the Chinese system for example). There are two types of students in this field: those who thrive under much guidance, or those who thrive when they are let loose. Which system is best suited depends on your character, interest and inclinations. Both have pros and cons – for example, letting loose may end up losing focus which is essential for in-depth study, while too much guidance narrows your perception and creativity at times.

He stressed the fact that we should strive to find something that interests us instead of simply following what our supervisors are doing. In his opinion, our early education (from primary school till pre-university) should give us some clues about our inclinations even if we may not know the exact thing we want – realising that inclination and pushing towards it is one important step in doing any research or embarking on similar journeys. Doing what interests us most in this sort of work is more important and more likely to end up being worthwhile. At undergraduate level, indeed we probably do not know enough – but knowing your tendencies are often enough to guide you.

This is especially so in this generation, when he was asked about the state of theoretical science today and how science may be different from that in the past. In the past, there were possibilities for graduates to focus very deeply easily in one field of study, but that was also because there were fewer problems to tackle in the past. Now physics as a field of study has become much broader and thinner, and mastering one sub-field is itself much more difficult than it was back then. In a sense, doing theoretical investigations and science in general was "easier" back then when it came to overcoming scope and depth, though choices were not that many. As compared to today, that broadening has resulted in the mastery becoming more difficult to attain, but at the same time it opened up many more doors to investigate: problems are much more abound, and technologies are much better.

Some examples that he gave was the development of hearing aids and MRI. Both were sort of developed in the distant past, but only in recent years were they developed



01. Scholars See Soo Teck (Year 3, Chemistry and Biological Chemistry) and Li Junru (Year 1, Aerospace Engineering) enjoying the dialogue with the Nobel Laureate.

02. The scholars were mesmerised by Prof CN Yang's sharing and insights.

to the extent they are today. Hearing aids have improved much, not from similar constructions but from a very distinct line of research in acoustics. MRI grew out of simple understanding of nuclear magnetic resonance in chemistry with an ingenious twist on the homogeneity of magnetic field generated. Those indicate that even the field of medical physics has so much more lines of attacks for people to study and pursue, and these was not nearly present in such amount back in the past. So is this good or bad, he asked. In the end, it depends on how you look at it: one thing that is clear is that the whole environment of science in its present form is very different from that in the past.

Hear what the other CN Yang Scholars said:

When asked how he goes about identifying important or worthwhile research topic, Prof Yang replied that he thinks all of us sort of know. That is we all know, from young and years of education, what interests us. And he feels, it is by cultivating this interest, that interesting and important discoveries are made. He gave an example of a professor at Beijing University whose childhood interest was to collect stamps. He realised that they are many stamps in the world, and even if he tried collecting all of them, it is unlikely to result in anything worthwhile. Thus he focused his energies on collecting just one type of stamps - stamps about Science. After he retired from his professorship at Beijing University, he published a book with photographs of all the stamps about science that he had collected. This book later won an award and now the professor had moved on to collecting stamps about Mathematics. Prof Yang gave this as an example of how an interest cultivated and developed can result in something valuable.

> Ng Chyi Huey Year 1 CN Yang Scholar from Mechanical Engineering with Business Minor

Prof Yang shared with us his own research experience. Through a series of interesting and thought-provoking stories, we are enlightened by his unique philosophy of research work and life. I was particularly amazed by one story about his refusing to publish a paper because he was not satisfied with the precision of the calculation even though his mentor had encouraged him to publish it. What I learnt from this is to always be prudent on the results so as to maintain a high standard for our work. I believe the success of Prof Yang is partly based on this.

> Li Junru Year 1 CN Yang Scholar from Aerospace Engineering

During the discussion, Prof Yang mentioned the difference between the states of theoretical sciences then and now: Back in his time, technology was not well-developed and thus limiting the choices of problems that scientists could investigate. In our current time, supercomputers and the like give modern theoretical scientists a plethora of directions to venture into. As such, he encouraged us to not be afraid of the prospect of working in the field of theoretical sciences because its range of development, contrary to what most may think, is indeed extremely large. As a student aspiring to be a theoretical physicist, on the one hand, I feel motivated to continue pursuing my dream. On the other hand, I also come to deeply admire the power of pure thought and logical reasoning that has allowed Prof Yang, despite the lack of modern research technology in his days, to come up with brilliant ideas that are still relevant, if not of utmost importance, nowadays in understanding how the world works.

> Duong Nghiep Khoan Year 1 CN Yang Scholar from Physics with Second Major in Mathematical Sciences