

## **Report – A Year in France**

In September of 2013, I have arrived to France, after having been accepted to PhD studies in SUPELEC – Grande Ecole des Sciences de l’Information et de l’Energie. My thesis, entitled ‘Interactive Communication for Distributed Computing’, is supervised by Prof. Romain Couillet, Prof. Pablo Piantanida and Prof. Mérouane Debbah. During the first year of the studies, which yielded considerable costs for moving into and integrating in a new country, I was lucky enough to be the recipient of the Chateaubriand fellowship.

During this year, the main focus of my research was on a field of Information Theory called ‘Hypothesis Testing’. The main idea is that unlike in traditional communication systems, the statistics of the source are not necessarily known. Therefore, before the receiver can decode the information transmitted to it, a decision has to be made about the true statistics of the source. This process, of course, may impair the system, in terms of the amount of information that can be transmitted reliably. The exact implications, however, remain unknown in the general case.

Significant achievements regarding this question have been made, and will be published in the near future. First, a paper entitled ‘Joint Estimation and Detection Against Independence’ by Gil Katz, Pablo Piantanida, Romain Couillet and Mérouane Debbah, has been accepted to the 2014 IEEE 52<sup>nd</sup> Allerton Conference on Communication, Control and Computing, and will be published in the conference proceedings shortly after it takes place, at the end of September 2014. In this paper, the optimal rate-error-distortion region for hypothesis testing and source estimation is presented and proved, for an interesting special case called ‘testing against independence’. Another paper, focusing on the general case, is currently being prepared for the 2015 IEEE Information Theory Workshop, taking place in Jerusalem, Israel.

In parallel, progress has been made in research on a different subject, in cooperation with Distinguished Professor Shlomo Shamai (Shitz) of the Technion in Haifa, Israel, and Dr. Benjamin M. Zaidel. This research, closely related to the subject of my MSc thesis, written under the guidance of the same counselors, is aimed at understanding the implications of local

cooperation in cellular networks. A paper entitled ‘On Layered Transmission in Flat-Fading Clustered Cooperative Cellular Architectures’, by Gil Katz, Benjamin M. Zaidel and Shlomo Shamai (Shitz), has been accepted to the 2014 IEEE 28<sup>th</sup> Convention of Electrical and Electronics Engineers in Israel, and will be published in the conference proceedings shortly after it takes place in December 2014. A comprehensive Journal paper will be published shortly thereafter.

Future cooperation between our team in Supelec and Prof. Shlomo Shamai is also planned. Prof. Shamai will be visiting Supelec, as he does every year, at the first week of September. We will then get the opportunity to discuss future work. One possible aspect, suggested by prof. Shamai, aims to study the implications of finite capacity back-haul links on the performance of clustered cooperative cellular networks, much like the networks studied in our previous work.

This last year has also been very busy for me personally. Starting in Supelec, I found a greatly functioning and very friendly group of accomplished researchers and students. The beginning of the year was laden with arrangements related to immigration and starting up in a new city. After significant hardships, I found a small apartment in the 14<sup>th</sup> arrondissement of Paris, at a short distance from Denfert Rochereau. Living there offered me both a convenient commute to Supelec and the opportunity to integrate into Parisian life. I was lucky enough to make many new friends, both in Supelec and in Paris, experience many new things (including a childhood dream of going to the Roland Garros final) and work in a friendly and professional environment.

I would like to take this opportunity to thank you for choosing me as a recipient of the Chateaubriand fellowship. As I mentioned, the scholarship has allowed me to cover the costs of moving to a new place, especially considering the cost of living in Paris.

I wish you all the best,

Gil Katz.