Meeting with Prof. Charles Kemp − report

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November 22, 2019

Previously

Previous talk (and the first one) was about the general purpose of the project. The different project options with respect to my interests were:

1. Physical reasoning (physical judgments, intuitive physics...)
2. Hypothesis generation (the problem of how we initiate the search for new hypotheses that fall outside the current hypothesis space)
3. Decision networks (goal oriented Bayesian networks)
4. Interactive epistemology (modelling belief and knowledge states updating when an agent take into consideration other agent's belief and knowledge).

But after deliberating the choice was reduced to these two options : **Hypothesis generation** and **Interactive epistemology**

Current prospects

The goal of this meeting was to talk about the exciting problem of Hypothesis generation that I prefer to work on, putting aside the Interactive epistemology option.

But addressing this problem head on seems to be too much ambitious, and it's a too large question. Then an idea would be to see how we can model the ***surprise*** effect. What characterizes the surprise and how to get a measure of it ? It's interesting because it appears that the surprise is not necessarily captured by the mere occurrence of a rare event (i.e. associated with a low probability). In this regard, surprise doesn't maybe rely on absolute probability. The notion of expectation (expected probability) is obviously required to more consistently characterize surprise.

The theme of *surprise* is intriguing me a lot not only because it sounds essential in the hypothesis generation process, but also for a personal reason : indeed I think that being surprised was necessary to the economics of thinking of my ancestor, Joseph Nicéphore Nièpce[1], the inventor of photography and of the first internal combustion engine named *pyréolophore*. He often wrote down how much excited he felt when facing unexpected phenomena (like when he realized that the Bitumen of Judea he originally used as fuel for

[1]The grandmother of my grandmother, Marie-Louise Nièpce, was his great-granddaughter !

his engine was also photosensitive...). I never thought that I would talk about him in a Lab, but maybe is there in his history some funny examples I can work with in order to model patterns in the feelings of surprise.

But I also keep in mind a project which would address this problem (how to characterize surprise and figure out its potential role in hypothesis generation) in context of physical judgments. Maybe how to characterize (measure) my feelings of surprise when I'm observing unexpected object trajectories, or something like that. However, maybe working on some links with physical judgments is not a good strategy (since as Charles Kemp noticed it there is already a quite large corpus of studies about models of physical judgments, I don't know...).

I also mentioned that I'm more interested in adults than in child development, but of course I'm open-minded.

Advice and caveat

My first thoughts and questions were too much general and abstract. I need to think about concrete examples of situations where current models of surprise (if pursuing this idea of project) don't apply well. Charles Kemp proposed for instance to look at urn-based examples, but it's just a prospect.