**An Interview with Dr. Levente Orban**
**Scott Douglas Jacobsen**

**Tell us a little about your background.**

I will begin with KPU because it is a common thread between us. I did my BAA degree from 2003-2008. I left for a psychology program at the University of Ottawa. It was a combined Masters and PhD degree.

I was hired back here at KPU. It is good to be back. I am a young faculty member working with those who taught me.

(Laugh)

**(Laugh)**

**Who were some of the people that stood out to you?**

It is an interesting situation. The funny thing is that I know more than half of them. (Laughs) John Marasigan, Wayne Podrouzek, Farhad was my honors supervisor, Cory Pedersen, Danny Bernstein, I can keep going down the list. I worked for Kurt Penner as a student assistant for most of my time at Kwantlen.

I am familiar with each of them. As students, we get to know the faculty members in a way that we don't get to know them even as colleagues. It is interesting to know their back story, as they express themselves in the classroom.

**For the doctoral work, what was the research question? What was the finding?**

I worked with bumblebees there. The general question: what is it that helps bees find their first flower or leads them to their first floral contact? If they have never seen a flower before, never had prior contact or experience outside of the nest, how do they do it?

There are questions around visual biases and visual guidance. We've done most of the work in a lab setting. We have decomposed a flower into its constituent parts, like colour, shape, symmetry, spatial frequency and markings.

We have printed shapes that manipulate each one of these components, and recorded where bees land. It is a behavioural approach to answer this question.

That was 6 years of work. We found several features that bees were predisposed to explore more than others. That might correspond to the first form of contact.

**With respect to time at KPU as an instructor, what tasks and responsibilities come with this position?**

It is an interesting situation. The mandate of polytechnic Kwantlen received in 2008 came with a vision to become a center for applied research. I was encouraged and supported to start this bee lab when I came to Kwantlen in 2014. The Bee Lab space is really quite simple: we took a small classroom and converted that into the bee lab. It has a flight cage, consisting of a

steel frame and mosquito netting, which has to be made of aluminum mesh material because bees chew through everything. There is also a glass pane on one side for camera access.

We can point these high definition cameras inside the flight cage and record precisely what bees are doing inside of it. This is a novel thing. I spend a fair amount of time in the bee lab and with students interested in doing bee studies in the bee lab.

There is service to the university such as committee work and various projects, workshops, and things like that.

**Your research seems to involve behavioural informatics. What is it?**

There are so many ways to study the brain: we can look at its molecular bases, understand the biochemical cascades, we can map the neural wiring, and anatomical features. Behavioural informatics is interested in the information content that is passed on by the brain.

For example, in the case of vision, how does the brain represent information? What is the signal that is receives? What does it do with this information? Our abstract concepts are represented by this wet software that the brain is. I am interested in the information processing characteristics of the brain.

**You take comparative psychology into account too.**

Yea! I teach it. It is such a great area. The starting point is that human beings are not the only ones with the brain, nor are they the first ones with a brain. If we want to know how the brain functions, we have to look at how brains that are easier and simpler to understand work.

If we look at brains that came before us, we can see the human brain is incrementally bigger and greater, but it is not a whole new redesign. It has some new bells and whistles, but that's it.

**What are some common features between bees and human beings' cognitive architecture?**

Of course, the information processing is there. If you look at the light showering our brain and the bumblebee's brain, the physics of it is the same. It is electromagnetic radiation. Both bumblebee and human brains have to make sense of electromagnetic radiation alike.

There are similar evolutionary pressures to use this information correctly. It is as crucial for us as it is for the bumblebee brain to decode the "message." If the bumblebee brain does not decode the information in a correct way, the bumblebee will die. It will not find a flower. We will not find a mate or food.

There are many questions to ask using bumblebees. There are questions in memory, decision-making, attention, even emotion. Emotion tunes organisms to react to the environment in an appropriate way. We don't know about insects, but emotions are thought to be a fundamental feature of brains.

**Who are current collaborators?**

I have a lot of students. I have nearly a dozen. Everyone seems to be interested in bee research!

(Laugh)

**(Laugh)**

They are mainly my collaborators. I had one student (Sherri Graham) go to UBC to assist with taste perception experiments using flies.

**KPU has a number of labs. Any collaboration with them?**

I have collaborated with Dr. Deborah Henderson at the KPU Institute for Sustainable Horticulture. We compared different species of bumblebees on tomato plants in the cutting edge KPU research greenhouse.

I am looking to collaborate with folks in physics and computer science. There are huge applications in both of these areas. They are an attempt at implementing some of the features of the bee, but there are many, many different questions and things that could be implemented. For example, there is robobee, which is a project at Harvard aimed at simulating how bees fly.

**Where do you hope to take this and other research?**

The Holy Grail of psychology is how does the brain work, how does consciousness arise, and really finding the Rosetta Stone of the brain. We know so much about it, but our tools are quite limited. fMRI and EEG are Stone Age tools to figure out what the brain is doing. We need entirely different tools to understand the language of the brain, how it conveys signals and how it constructs complex representations.

**What defines consciousness – and its source?**

I will go with the neuroscientific standard definition, but there are some interesting other definitions out there. The standard definition is that consciousness requires at least three components. One is awareness of the environment, which in principle even a Tesla vehicle possesses.

The second is being awake (as opposed to being drunk, or sleeping), a criterion that many animals can meet. The third one is self-awareness, which most animals don't meet – being able to contemplate one's own existence. This criterion shuts out most of the animal kingdom from the consciousness club.

The neuroscientific view is that the brain generates consciousness. We are likely talking about some few key brains structures where crucial information comes together.

There is no consensus on this definition. There are philosophers who think, for example, that consciousness is a universal physical property like time, space, and mass. In this view, consciousness is defined as the amount of information processed in a given space-time coordinate. For our brain, it would be quite high, but a computer could also be conscious by this definition.

**It's a matter of stacking nodes and interconnections.**

(Laughs)

**For the third criterion, self-awareness, does the linguistic facility seem central to this ability?**

That's the current thought out there. There are three crucial parts. One of them is the language center, the left hemisphere. Language is one of them.

**If you look at the evolutionary record for human beings, we arose 100,000 to 200,000 years ago in the Great Rift Valley. If the argument is that for the most part humans qualify, or have sufficient linguistic capacity (along with the other requisites), for consciousness. With these precise definitional points, this might make consciousness new, evolutionarily. What is the survival advantage?**

We are hacking at these puzzles right now. Research has shown consciousness emerges quite late after an event. For example, if I throw a snake at you, you will react before becoming conscious. Your consciousness will help narrate what happened but it did not play a role in avoiding the threat of the snake flying at you.

It is a good question. What is the evolutionary adaptiveness of consciousness if it doesn't help you avoid threats in your environment? Perhaps it lies somewhere in planning and coordinating behaviours.

There are several other things happening with humans that are evolutionarily new. Anatomically, our cortex is greater, which enables greater capacity for abstraction. We are better at social interactions, we have a knack for numbers and we have fine-tuned language. When you add all of these improvement up, there seems to be a great advantage over other animals.

The most important difference is the dual nature of the way we interact with our world. We are not only able to see our world as it is, as it is objectively, but we can create stories about this same world. We have this metaphorical layer of meaning over objective reality. We can imagine how things should be and make it happen -- even chimps or apes can't do this. They see the world as it is. They don't have this ability to connect abstract ideas over and above the physical world.

**What defines qualia to you?**

Philosophers say it is the way sensations feel. The redness of the apple. The sensation of an odour. Some philosophers are not satisfied with the neuroscientific definition of consciousness because it doesn't explain qualia.

I haven't decided if it is a real problem.

**What defines free will? Any thoughts?**

Baumeister and colleagues come to mind. Maybe, you have read him too in your psych classes. You can modulate free will depending on the resources in the brain. The more glucose supplied to the brain, then more free will somebody is capable of exercising.

**You mentioned philosophers," as if a distinct classification in the conversation. If I taken into account Sir Isaac Newton, he was a "natural philosopher." Soon, that became scientist – and science. In direct way, scientists are natural philosophers, and so philosophers – historically and by definition.**

That's quite true. All scientists are doctors of philosophy.

Interview by Scott Douglas Jacobsen. He founded In-Sight: Independent Interview-Based Journal and In-Sight Publishing.