SHORT ESSAY

Studying temporal information processing

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Québec is the only one of ten provinces in Canada to be predominantly French. Laval University is located in the second largest city of this province, Québec city. This city is more than 400 years old, which is quite old for a North American city. About half a million people live in Québec, a city that is offering a variety of fine cultural activities. Laval University offers education in French and hosts more than 44,000 students and 1,100 professors.

My Perception and Neurosciences Laboratory is located in the middle of the Laval campus in a building where are located most research laboratories and administrative activities of the School of Psychology. This laboratory, which receives the financial support from the Natural Sciences and Engineering Research Council of Canada and from the Social Sciences and Humanities Research Council of Canada, is indeed dedicated to the understanding of various aspects related to timing and psychological time (<http://darwin.psy.ulaval.ca/~perception/>). In order to find the properties of what is assumed to be an internal clock responsible for the processing of temporal information, a psychophysical approach was emphasized in the lab over the past 25 years, with one critical question being whether or not Weber's law applies for time. This internal clock is described in many contemporary models as a pacemaker-counter device, with the accumulation of pulses emitted by a pacemaker providing the information about duration [1–3].

It is important to study time because much behaviour such as speech and music production requires temporal adjustments. Determining whether there is a central mechanism for serving these adjustments, and the exact nature and properties of such a mechanism, is a huge scientific challenge. Indeed, some researchers rather propose that each sensory mode has its own way of processing time. Whatever the exact nature of the process responsible for timing and timekeeping activities, one has to explain how the mechanism interacts with the regularities of events met in the environment, and what range of duration it covers. The time perception field was recently made even more exciting as it also benefited from the technological developments in neuroscience, opening up new research avenues.

The research activities in my laboratory include projects conducted within and across sensory modes. Because audition is the most efficient modality for processing temporal information, recent investigations were completed to understand different aspects of auditory temporal processing, in speech or with musician participants. The research projects also include experiments on the influence of space on time judgments, rhythm, the role of attention and memory on duration estimation and the learning and cross-modal transfer of temporal information. According to preferences of Ph. D. students, some projects are conducted on the effects of emotions, playing video games or using the internet on temporal distortions; and on the impact of various disorders or pathologies (schizophrenia, depression, autism, dyslexia) on temporal processing or psychological time. Moreover, the laboratory now offers the possibility to conduct electroencephalographic investigations, and it is possible to link scientific collaborations with members of research centres in Québec City for conducting experiments involving neurostimulations or fMRI.

REFERENCES

- [1] S. Grondin, "From physical time to the first and second moments of psychological time," *Psychol. Bull.*, **127**, 22–44 (2001).
- [2] S. Grondin, Ed., *Psychology of Time* (Emerald Group Publishing, Bingley, 2008).
- [3] S. Grondin, "Timing and time perception: A review of recent behavioral and neuroscience findings and theoretical directions," *Attention, Percept. Psychophys.*, **72**, 561–582 (2010).

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