Multimodal Aspects of Time Perception

Non-technical summary

Our ability to keep track of time is ever more important to how we live our lives. Schedules and appointments dominate the way that we plan ahead and organize daily routines. Time also has a distinct psychological dimension, which is independent the way that it is objectively measured. First, we know of the striking effects that traumatic and euphoric experiences can have on immediate experience of time. Time can appear to freeze or speed up rapidly depending on how we feel. This is also reflected in the way that we talk about time and the metaphors that we use to describe it. When we are having fun, time flies. Finally, anyone that has taken a long flight knows about jetlag and its effect on the internal biological rhythms of sleep and digestion. All of these aspects of mental time have a neurobiological basis and have been tackled by researchers across disciplines. What we are certain of, is that a full treatment of these issues demands an interdisciplinary approach where psychology, neuroscience, physics, and philosophy join forces to provide adequate explanations of how, where, and why mental time plays the role that it does in our lives.

The aim of this project is to shed light on just a few aspects of mental time. First on the way that perceived duration of events interacts with conscious experience. Second, it is to examine whether durations are perceived differently across the senses. That is, whether we hear time differently than we see it. Finally, it is to examine the way that perception of temporal features of the world interacts with the way that we act. While these three topics may seem disconnected at first, they all concern the same thing: the place of events perceived to last between a few milliseconds to a few seconds in the way that we interact with the world around us.

Let us start with the connection between action and time perception first. A soccer player waiting for a corner kick has many things that they need to excel at in order to hit the ball flying towards them to goal. One of them is to have impeccable timing in their jump. Jumping too soon or too late will certainly lead to a miss. Where does the soccer player get information about when to jump to hit the ball? From perception, of course, which informs them about the velocity and trajectory of the ball and about the other players around them. But information about these things is not sufficient. The soccer player has to process it fast enough for it to inform their actions immediately. One of the main aims of the proposed project is to elucidate this very interaction. In short, it is to explain how we can perform rapid, temporally informed actions given the seemingly impossible task of rapidly gathering and processing relevant information about the environment and bringing it bear on action. The key hypothesis of this work is that the mediating factor is perceptual information about time.

The second main concern of the project is to fully explain the sensory aspect of mental time. The way we see time is different from the way that we hear it. For example, sounds and flashes of the same duration are judged to be of different duration. Why is that case? Presumable, this is because different senses have different acuity with respect to time. Audition, for example, is known to be much better in discriminating fine differences between durations than vision. All of these differences, however, seem not to matter much to the way that time appears to us in consciousness. The fact that audition and vision are different in their ability to discriminate time is a surprise. We would never find out that that is the case if we just focused on the way that time appears to us to be in consciousness. This presents a puzzle that the second part of this project aims to resolve. Whatever the result of the analysis, it will shed light on the way in which mental time appears unified across the senses and the mechanisms responsible for that unity.

Finally, this brings up the more general question of consciousness itself and its temporal aspect. When time flies as it apparently does when we are having fun, is this merely an illusion? Or is there, perhaps, a psychological reality to this speeding up that is reflected in the way that we perceive durations of particular events? These are the questions that this project aims to answer as well.

All of the aforementioned questions can be answered from the perspective of empirically informed philosophy. Arguably, they can best be answered from such a perspective. This is because the questions mentioned above are all theoretically loaded and do not have straightforward, theory-independent answers. Due to its nature as theoretical enterprise par excellance and the training that philosophers undergo in theory evaluation and construction, philosophy is extraordinarily well position to carry out this work.

Philosophical work so-conceived involves two things. First in line is evaluation of extant theoretical models in light of counterexamples, both empirical and theoretical. Second is the task of theory construction. This second step is presumed to borrow from the results of the first, where what is best and most useful in dealing with counterexamples is borrowed to a new theory. If doing so is precluded or difficult, for whatever reason, the job of the philosopher is to come up with new synthetic treatments of the relevant issues. This is where the work of explanation, that is, the work of answering ‘why?’ questions and the work of showing how ‘it all hangs together’ becomes philosophy in its fullest sense and where real intellectual breakthroughs can happen.

The way that perceiving duration of things ‘hangs together’ with action, with consciousness in general and with the fact that we more than one sensory organ, is not obvious. In fact, it presents puzzles that have not yet been answered. An answer to the ‘why?’ question is not forthcoming, either. At best, we can speculate about the role of evolutionary pressure in the organizing our mental economy in a way that makes it possible for a soccer player to hit a fast-moving soccer ball. But such speculations come short of giving a genuine answer to the question. The real answer should come in a theory of ‘how it is built.’ In other words, we should be presented with a story about mechanisms that underlie these things. This last thing might be the best summary of the ambitions of this project. What we aim to do with it, is to explain how conscious experience of time, time perception, and action ‘are built’ based on what we know about each of these things separately. A key role in this enterprise are going to be inferences

about their relationships based in rigorous philosophical analysis.