Interdisciplinary Workshop on Movement Grammars: Brains, Robots and Dance

4 – 8 June 2018 @ Snellius

As the workshop approached its end, the overall feeling was of satisfaction among participants. The Lorentz centre provides an excellent environment for pursuing research, and participants met with enthusiasm and engagement the unconventional combination of embodied experience in the studio with an analytical approach to meaning in movement. “This is the most extraordinary workshop I ever attended” commented Prof Dong-Soo Kwon, or “I learnt a lot, I think this was the best workshop since I started my PhD”, wrote Maria Guadalupe Sanchez, spontaneous comments which give a taste of the overall satisfaction.

Our goals were:.

1. To bring together scientists, technologists and dance experts to formulate an interdisciplinary approach to understanding (extracting/interpreting) meaning in movement, based on the development of a movement grammar structure.
2. To give scientists practical insights on movement understanding through producing and watching dance and movement in the studio in a systematic way – a rare opportunity in the academic context.
3. To identify potential experimental set-ups in neuroscience and novel technologies that would validate the approach and exploit the proposed grammar.

The workshop constitutes a first step towards an interdisciplinary approach to meaning in movement. It provided a shared experience to researchers in robotics, neuroscience, linguistics and dance, so that we could being to explore with a common language and experience what is involved in understanding meaning in movement. We were able to discuss issues of timing, disposition, space and proximity in ways that would have been impossible before the workshop. The insights gained were perceived as easily applicable to the different disciplines, and there was a rich communication in all directions.

The goal of developing a movement grammar structure was beyond the possibilities of the timeframe of the workshop. We discussed what type of formalisation or modelling would be required, and we realised that the problem is much more complex than one that could be resolved in a week. Certain aspects of generative grammars were relevant in some cases, dynamical systems modelling seems necessary to grasp the temporal aspects of movement, while stochastic processes or big data analytics could be necessary for real-world applications.

Regarding goal 3, the workshop moved towards the idea of dancing robots, due to the interests in the topic from all participants, because it was felt that robotics provided the right type of abstraction required for an interdisciplinary approach. We found that different requirements and methodologies would be necessary depending on the different interpretations of “robot dancing” that could be adopted.

In order to make a humanoid robot dance like a human, we must understand the complexities of movement generation, and how the issues of equilibrium and stability are influenced by the first movement session on phrasing we experienced. When considering non conventional robot shapes, issues about the relationship between disposition and levels in the vertical space depend ultimately on the type of robot. Furthermore, dancing in robots was seen as a having great potential for dance researchers to clarify the fundamental questions of what is dance.

Another great area of application is social robotics. Issues on proximity that we dealt with the third day were perceived as directly relevant for adequate human robot interaction. Somehow unexpectedly, the issue of what is the relationship between dance and the expression of emotion became a hot topic – which led us to discussions on the nature of emotion as phenomena that comprise physiological, behavioural and cognitive dimensions and could not be reduced to discrete emotion ascription.

Regarding the outcomes of the workshop, on Thursday we delivered a public event at the Rijksmuseum Boerhaave in Leiden, in which we tried to combine the qualities of improvised performance with the idea of sharing issues and ideas about the topics of the week. It was a very experimental approach, followed by a 1-hour discussion with the audience which engaged fully.

We are also preparing two papers. The first deals with the role of embodied experience in scientific research in disciplines that deal with embodiment, through the experience we have shared this week. The second articulates the different positions in relation to the project of creating robots that can dance, from humanoid robotics, social robotics and autonomous systems perspectives.

Several ideas for collaborative projects, a research network, a special issue, and potential re-edition of the meeting with further goals have been discussed.