Hermann Lotze Price 2011/2012
Laudation of Peter Gärdenfors

by Peter beim Graben, Humboldt-Universität zu Berlin, 09.02.2012

Dear colleagues, dear Peter.

Today, I have the great pleasure to give a speech in honor of one of this year's *Hermann Lotze Price* winners, Peter Gärdenfors.

After studies in mathematics, computer science and philosophy, Peter Gärdenfors received a PhD in philosophy in 1974 at Lund University with a dissertation on group decision theory. Since then, he held various positions at the Swedish universities of Lund and Umeå and became Professor of Cognitive Science at Lund University in 1994. He was visiting professor at numerous places, among others in Buenos Aires, Rome, Paris, Sydney, and – during this term – at the Humboldt-Universität zu Berlin.

Peter Gärdenfors is Member of the Royal Swedish Academy of Letters, History and Antiquities, of the Royal Swedish Academy of Science, and also, since last year, of the Nobel Prize Committee for Economy. In 1996, he was awarded the Rausing Prize in Humanities and in 2008 with the Prize for Interdisciplinary Research by the Royal Academy of Sciences in Uppsala.

Peter Gärdenfors is a distinguished scientist in the fields of Philosophy of Science, Cognition and Language. His approaches in these directions are highly interdisciplinary: involving mathematical analysis, neural network simulations, interacting agents and robotics. From his impressive publication record, I would like to select only three studies, that have been influential to many researchers belonging to the "International Szklarska Poreba Center for Experimental Philosophy & Pragmasemantics" (including myself).

1. The book *Knowledge in Flux: Modeling the Dynamics of Epistemic States* from 1988. With this volume, Peter Gärdenfors initiated the disciplines of dynamic semantics, epistemic logics and pragmatic information theory. According to this approach, the meaning of a proposition is not its truth value or a set of possible worlds, but rather its impact upon the epistemic state of a cognitive agent. Peter Gärdenfors proved here that epistemic propositional logics is actually equivalent to intuitionist logics. Including accounts to non-commutative belief-revision and Bayesian update semantics, his dynamic semantics exhibits formal analogies to generalized quantum theory and algebraic representation theory. In the former, observations are expressed as mappings over some state space whose composition is not necessarily commutative (similar to category theory), in the latter the algebraic structure of those observations becomes represented by matrices acting on a vector space. In this sense, the interpretation functions of dynamic semantics "represent" the meaning of a message by conditionalizing an epistemic state in analogy to an operator that represents a measurement by contracting the "wave function" during the famous "quantum-leap".

2. The short communication *Nonmonotonic inferences in neural networks* from 1991, published together with Christian Balkenius, contributes to the longstanding controversy between cognitivism and connectionism about symbolic representations in neural networks. Here, Peter Gärdenfors showed that the transient dynamics of attractor neural networks implements non-monotonic inferences when the neural activation space is partitioned into cones representing "schemata". This research led to important insights about the possible relationship between the symbolic and subsymbolic levels of description in dual-aspect accounts of cognitive processes, such as in optimality and harmony theory.

3. The recent paper *Semantics, conceptual spaces, and the meeting of minds*, published in 2011 together with Massimo Warglien, rests upon Peter Gärdenfors' book *Conceptual Spaces* from 2000, and will probably be addressed also in his Sunday lecture. There, Peter Gärdenfors used "conceptual spaces" that are spanned by quality dimensions, such as color, taste, or space. Equipping these spaces with a similarity topology, allows to define natural concepts as convex regions in conceptual space that are centered around prototypes. Different concepts provide a partitioning of conceptual spaces of cognitive agents that could emerge from signaling games as described by evolutionary game theory. Compositionality results from the properties of product spaces, and a "meeting of minds" is described as a fixed point of a continuous mapping between conceptual spaces of two interacting agents, which is – language. From another point of view: language affords the comparison of individual conceptual spaces over the distance, thereby serving as a gauge field in analogy to quantum gauge theories.

Altogether, Peter Gärdenfors' scientific opus, just exemplified by the three publications mentioned above, addresses and actually solves a number of longstanding problems in philosophy, logics and cognitive science. His work was and still is very influential for many other scientists.

Last but not least, Peter is also well known for his editorial activities. He served as editors for *Theoria* from 1978 until 1986, and for the *Journal of Logic, Language and Information* from 1992 until 1995.