C6.1 Philosophy of the Applied Sciences and Technology

The necessary revision of a topic: the homo faber is not the only animal faber

Ana Cuevas-Badallo, Philosophy, Logic and Aesthetic, University of Salamanca, Salamanca, SPAIN

It is a commonsense that the human beings have the capability of creating tools, machines, or in general artifacts. The definitions proposed in philosophy of technology about artifacts always involve the idea of human beings as their creators. See for instance the definition posed by Hilpinen (Hilpinen 1993, 156–157): “An object is an artifact if and only if it has an author.” The idea of an author implies always the notion of an intention, which determine the intended character of the object. Other kind of definitions take into account the functional character of artifacts: “what makes artefacts unique (...) is not just that they have functional essences, but that their functions are determined by the intentions of their producers.” (Baker, 2006: 132) Again, functions are related to intentions. And the same can be said about the definition proposed by the members of the Delft group, and the dual nature of artifacts: technical artefacts can be said to have a dual nature: they are (i) designed physical structures, which realize (ii) functions, which refer to human intentionality. [...] In so far as technical artefacts are physical structures they fit into the physical conception of the world; in so far as they have intentionality related functions, they fit into the intentional conception. (Kroes & Meijers, 2006, p. 2). All the definitions presuppose that the human beings are the only animals able to create intentionally tools. Nevertheless the new advancements in ethology have showed that there are many other species able to create tools too. I would like to show the main differences and the main similitudes of human and (other) animals creations, trying to avoid the anthropocentric view but avoiding at the same time anthropomorphism. The extreme examples (anthill) and the hooks of the New Caledonian Crows need to be correctly classified.

Analysing Framing in Design Reasoning

Pieter Vermaas, Philosophy, Delft University of Technology, Delft, NETHERLANDS

Capturing the specificity of design reasoning is de facto self-defeating by the existence of designers. There is descriptive work how designers reason and prescriptive methods how
designers can improve reasoning. Yet, when analyses capture the state of the art, designers start thinking ‘outside the box’ and introduce new forms of design reasoning.

Relative to engineering design one new reasoning form is framing as introduced by Donald Schön. Through framing designers reformulate the problems of clients, an ability that is seen as specific to innovative design. Framing is moreover a success term: by framing designers not merely provide solutions to problems but also let clients understand their problems and identifying new opportunities.

Methodologically framing raises the question under what conditions a solution to a reformulated problem counts as a solution to the original problem. Two analyses of framing given in design research are silent about this question; in my presentation I give a third for finding conditions to success and failure of framing.

A design problem is analysed as consisting minimally of two elements: a current state of affairs S and a goal state of affairs G. Framing is modelled by two reasoning schemes: one in which the designer reformulates the goal G in the client’s problem <S,G>; and a second in which the designer characterises the current state of affairs S in the problem as being of a specific type T of states of affairs. The second reasoning scheme leads to a framed problem <S,G,F_T>. It is argued that the frame F_T can be represented by solution directions to realising G from S that the designer makes available by characterising S as of being of type T. For both schemes conditions are given under which a solution to a reformulated problem is not a solution to the original problem.

### Projective Simulation and the Taxonomy of Agency

Léon Homeyer, Philosophy, University of Stuttgart, Stuttgart, GERMANY

Giacomo Lini, Institu für Philosophie, University of Stuttgart, Stuttgart, GERMANY

In this paper we focus on behaviourism and materialism as theory-driven approaches towards the classification of AI in particular and agency in general. We present them and we argue for the fact that none of them can provide a full blown account of agency and intelligence.

Our next step is to analyse the ps model, a form of utility-based agent recently developed in the field of embodied cognitive science. We describe its internal working structure as a stochastic network of so-called clips step-wise updated, and how this structure characterises its main features. We individuate in its capability to perform projections its main characteristic.

We show that none of the two theory-driven approaches to AI is able to account for this
feature, and we suggest that projection is a functional link between behaviourism and materialism, according to the fact that for its full blown characterisation we must refer both to behaviouristic elements (the agent-environment interactions) and materialistic ones (internal processes which may not be manifest in terms of a change in the agent's behaviour).

This analysis allows us to present a feature-driven (or reversed) taxonomy of the concept of agency: we sketch its main characteristics and we show that it allows a comparison of different agents, based on the individuated functional link of projection, which is richer than the purely behaviouristic and materialistic approaches. The reason for that lies in the fact that we have reversed our approach towards agency from a theory-driven stance to a process-driven one.

A semantics for technical norms and practical inferences

Peter Kroes, Technology, Policy and Management, Delft University of Technology, Delft, NETHERLANDS

Sjoerd Zwart, Delft University of Technology, Delft, NETHERLANDS, Maarten Franssen, Delft University of Technology, Delft, NETHERLANDS

We assume a systematic corpus of knowledge can be found in technology which we will refer to as ‘the science of engineering design’. An important, and still open question about the relationship between science and technology (or engineering) is, then: what is the form of the ‘knowledge bearers’ within this science of engineering design? Niiniluoto (1993) has proposed, following up on previous work by Von Wright (1963), that the basic constituents of design research are ‘technical norms’, claims of the form ‘If you want A, you ought to do B’. However, Niiniluoto and Von Wright have different intuitions concerning the epistemic status of technical norms: according to Niiniluoto they have a truth value, whereas Von Wright was doubtful. The aim of this paper is to clarify this issue, and correspondingly to investigate whether practical syllogisms, which are arguments having a conclusion of the form ‘you ought to do B’, can be valid and if so, what determines their validity. Building on Hughes et al. (2007) and Meyer (1988) we outline a possible world semantics for technical norms and practical syllogisms. The main thrust of our approach is the idea that the intuitions of von Wright and Niiniluoto need to be grounded on the possible world semantics of dynamic logic in which actions of agents change possible worlds. We propose to interpret the statement ‘X wants A’ as ‘X obliges herself to bring about A’. This interpretation enables us to use John Jules Meyer’s deontic dynamic epistemic logic to give a truth value to statements of the form ‘If you want A, you ought to do B’: if in our world achieving B is a necessary condition to bring about A, it is true, but if there are paths towards an A-world that do not involve achieving B, it is false.