

DUALITY OR DUALISM?
A REPLY TO JOHAN STELLINGWERFF

MARC J. DE VRIES

In *Philosophia Reformata*, Vol. 69, No. 1, Johan Stellingwerff published a challenging article¹ on the need to rethink the philosophy of technology in reformational philosophy. Stellingwerff is not only critical about the work done by Van Riessen and Schuurman, but he also criticizes the Dual Nature of Technical Artifacts program at the Delft University of Technology.² In this reply I want to take up particularly some of the points of criticism against the latter and see if they can be upheld when taking a closer look at what has been published in this program so far. Although the article by Stellingwerff is in Dutch, I have decided to write my reply in English to enable a wider audience to take part in the debate.

In the first section of his article Stellingwerff³ discusses the way Van Riessen described the differences between traditional and modern technology. Van Riessen considered this difference primarily to occur in the scientific basis for modern technology, while traditional technology he believed to be more craft-based. Stellingwerff is correct in stating that in traditional technology we can find the use of scientific knowledge as well. For that reason he does not agree with Van Riessen in the way he distinguished traditional and modern technology. This criticism, though, ignores the fact that the relationship between the growth of scientific knowledge and technological developments has changed deeply over time. Andries Sarlemijn, former professor of philosophy of technology at Eindhoven, has carried out extensive empirical study to investigate these differences.⁴ Stellingwerff criticizes Van Riessen for insufficiently taking notice of empirical data; this cannot be said of Sarlemijn. In his studies, Sarlemijn showed that in the ancient period (to which Stellingwerff also refers) the emergence of scientific knowledge was often by systematically collecting technological experiences (for instance, in making alloys) and thus building up an increasing amount of scientific data. In the period in which the classical natural sciences emerged we see a different pattern, according to Sarlemijn. Perhaps this can best be illustrated by observing the way thermodynamics evolved in an interaction with hot air engine designing.⁵ To improve their

¹ Stellingwerff, Johan, 'Herbezinning op de Filosofie van de Techniek', *Phil. Ref.* 69 (2004) 77-92.

² See www.dualnature.tudelft.nl

³ Stellingwerff 2004, p. 77-79.

⁴ Sarlemijn, A., 'Designs are cultural alloys. STeMPJE in design methodology', in: Vries, M.J. de, Cross, N.G. en Grant, D.P. (eds.), *Design Methodology and Relationships with Science*, Dordrecht: Kluwer Academic Publishers, 1993, 191-248.

⁵ Vries, M.J. de, 'The Philips Stirling engine development: a historical-methodological case study into design process dynamics', *Methodology and Science* 26: 74-86.

designs, designers of hot air engines needed knowledge of what happened with the hot air inside their engines. Physicists then started describing this in a rather abstract way, using several idealizations. Thus a back-and-forth movement between science and technology emerged: technology demanded new scientific knowledge, which was developed by scientists, and applied by the designers. The improved designs raised new questions about the gases, which again were taken up by the scientists. This pattern is different from the way science and technology developed in the ancient period (see above). Although this was not exactly the way Van Riessen defined the difference between traditional and modern technology,⁶ he was certainly looking in the right direction.

Stellingwerff regrets that Van Riessen too soon abandoned his original efforts to reflect on the nature of technology itself and moved towards reflecting on the position of technology in our culture. Likewise, he deplores that Schuurman paid much more attention to the cultural philosophy of technology than to what we would call now analytical philosophy of technology. Indeed, interesting reflections might have been the result if Van Riessen had continued his original line of search. The originality of this line of search motivated Haaksma, Vlot and Cliteur to publish a book in which this aspect of Van Riessen's work was taken out of the dust of time and praised for its innovativeness.⁷ But the choice of both Van Riessen and Schuurman must be assessed against their contemporary background. Nearly all philosophy of technology at that time was in the realm of Continental philosophy, and Van Riessen and Schuurman, wanted to participate in the debates of those days, and for good reasons. Today we are in a different situation. That does not mean that critical cultural reflections on technology are no longer needed, but in the general philosophy of technology arena there is now much more attention for the analytical approach, including questions about the nature of technology, technical artifacts and technological knowledge.⁸

In the second section of his article⁹ Stellingwerff acknowledges this. In particular he refers to the recent efforts to characterize the nature of technical artifacts, and to its context. This is called the empirical turn in the philosophy of technology. The term 'empirical turn' has caused misunderstandings. Schuurman in his farewell lecture at Delft¹⁰ pointed out that an empirical turn does not agree with what one should expect from philosophy. Empirical data cannot bring forth sound criteria on the basis of which normative reflections on technological developments can be founded. In conversations with him and other reformational philosophers it struck me that the empirical turn is almost immediately associated with the school of social constructivism. This

⁶ Stellingwerff 2004, p. 77.

⁷ Hans Haaksma (m.m.v. Ad Vlot en Paul Cliteur), *Van Riessen, filosoof van de techniek*, Budel: Damon, 1999.

⁸ Carl Mitcham, *Thinking Through Technology*, Chicago: Chicago University Press, 1994.

⁹ Stellingwerff 2004, p. 79-81.

¹⁰ Schuurman, E., 'Bevrijding van het technische wereldbeeld', in: Kees Boersma, Jan van der Stoep, Maarten Verkerk en Ad Vlot (red.), *Aan Babels stromen. Een bevrijdend perspectief op ethiek en techniek*, Amsterdam: Buijten & Schipperheijn 2002, 255-295.

school indeed shows a tendency to let sociological studies dominate in philosophical debates, and normative reflections on technology are not found in this school. I would rather like to call this line of thinking the *sociological* turn in the philosophy of technology, to distinguish it from the much more modest way in which empirical studies are used in the empirical turn. Here empirical studies are no more, but also no less, than sources of inspiration for conceptualizing technology, technical artifacts and technological knowledge.

In my own work I try to make my previous study of the history of the Philips Research Laboratories¹¹ fruitful for exploring the nature of technological knowledge. In no way can the empirical data replace philosophical reflections, but they can help to ensure that what we write in philosophy is the same as what we see happening in practice. Often Continental studies in the philosophy of technology lacked such a critical assessment of the empirical validity of the often negative and broad statements about technology. Let me mention the example of Heidegger,¹² who claimed that using a hammer would imply a certain embodiment of that device because the user after having picked it up from the table and using it for hammering a nail into a piece of wood, would no longer be aware of the presence of the hammer in his hands (only when the hammer failed it would return in the carpenter's awareness). One could doubt if Heidegger ever closely watched a carpenter using a hammer. Probably he would then have noticed that a carpenter may very well be aware of the hammer being in his hand and closely watching its whereabouts in order to prevent accidents to happen. So his example does not tell much about the practice of technology. This is just a simple example of how neglecting empirical reality may lead to reflections on technology with a very limited empirical validity.

Stellingwerff is well aware of the value of an empirical turn in the philosophy of technology. He does not, however, agree with the way it is practiced in the Delft 'Dual Nature of Technical Artifacts' research program that deals with the nature of technical artifacts.¹³ In section 6 of his article he elaborates on this. In particular the term 'Dual' in that program ('the Dual Nature of Technical Artifacts') causes him to object to what he considers to be a dualistic approach. It is questionable, however, whether the Dual Nature researchers can indeed be accused of dualism. ('Accused' seems to be a proper term here, because who would nowadays be happy to be called a 'dualist' in philosophy?). In my conversations with the Delft researchers it always strikes me that they are fairly hesitant to make ontological claims, and tend to point rather towards the epistemological claims. What they want to investigate in the first place is how both designers and users can perceive and know artifacts in two distinct ways: as objects having certain physical qualities, and as objects to which they can ascribe a certain function. Perhaps the terms 'physical nature' and 'functional

¹¹ Vries, M.J. de, *80 Years of Research at Philips. The History of the Philips Natuurkundig Laboratorium, 1914-1994*, Eindhoven: Stichting Historie der Techniek, 2001.

¹² Martin Heidegger, *Being and Time*, New York: State University of New York Press, 1996, p. 67.

¹³ See footnote 2.

nature' that are used by the researchers to indicate these two ways of perceiving a technical artifact, suggest more ontological claims that the researchers intend to make. The description of the research program, though, does emphasize the epistemic claims more than the ontological claims. For instance, Houkes' and Vermaas' publications¹⁴ in the context of the Dual Nature program nearly all deal with *knowledge* of functions and *ascription* of functions. It is only now, almost at the end of the project, that the researchers feel the need to account for the possible ontological consequences for what they wrote on knowledge of functions.

But even though the Delft researchers themselves do not make many ontological claims, one could discuss the question of whether or not dualism would be the necessary outcome? Does the observation of duality in ontology necessarily lead to a dualistic approach? Who could better come up with an example that shows that this is not the case than reformational philosophers who know about the discussions on the two natures of Christ in theology?¹⁵ It is very much in line with the Reformation of Luther and Calvin to acknowledge the dual nature of Christ. But seldom the consequence is drawn that Luther, Calvin and those who follow their tracks, must be regarded dualists. And here the claims are certainly of an ontological kind, and do not only refer to different ways in which we can know Christ. This example should make us careful to make an easy transition from acknowledgement of a dual nature towards the accusation of a dualistic approach. Evidently there are more nuances here.

Let us see if it is possible to agree with the idea of a physical and a functional nature without being a dualist. In my inaugural lecture in Delft¹⁶ I have tried to do that by pointing out that one could see the physical nature as the lower modalities in Dooyeweerd's approach to reformational philosophy (the modalities up to the biotic) and the functional nature as the higher modalities (the psychic and up).¹⁷ This can be justified if we realize that the Dual Nature approach does not split up technical artifacts into two parts, as happens in the mind-body dualism. The artifact as a whole has an existence in a physical sense, and also it has an existence in a functional sense. I agree with

¹⁴ A full list of titles can be found at www.dualnature.tudelft.nl/publications/main_publications.htm

¹⁵ Of course this example has nothing to do with philosophy of technology. I chose it because I think for Christian philosophers it is one of the most obvious examples where acknowledgement of a dual nature is not equal to dualism.

¹⁶ Vries, M.J. de, *Filosofische kijk op technische kennis. Reformatorisch-wijsgerige beschouwingen over de aard van technische kennis*, Delft: Delft University of Technology, 2004.

¹⁷ Where precisely the boundary lies is a matter of definition of the psychic aspect. Dooyeweerd defined it in such a way that animals can be subjects in this aspect, because they can perceive and feel. Personally I am inclined to reckon these abilities to be part of the biotic sphere and if there is to be a new element in the aspect following the biotic I would prefer that to be intentionality and related to that, selfconsciousness. I prefer to draw the boundary between the physical and functional natures at the biotic, and not at the physical aspect, because features of life can be reckoned part of the physical nature of the artifact, in particular in the case of biotechnology. It should be emphasized that the term 'physical' in 'physical nature' has a wider meaning than in 'physical aspect'. (In Dutch two different words are available: *fysiek* and *fysisch*. Unfortunately both translate into the English word *physical*.)

Stellingwerff that the use of the term functional is fairly narrow here and excludes the material properties of which Stellingwerff offers some examples. But if we can bear with that narrow use of the term for a while, we can recognize that we are not far away from Dooyeweerd's modalities. It is only that Dooyeweerd's fifteen modalities have been put into two groups. Is it in conflict with Dooyeweerd to do that? Did he not try to show the richness of reality by pointing out that there is a whole variety of modalities, in each of which things exist? Indeed the Dual Nature approach simplifies that dramatically, and that has evoked comments such as the remark by Carl Mitcham that only two natures is a rather poor description of such a complicated thing as a technical artifact.¹⁸ On the other hand, the period of the Dual Nature program's existence has shown that this simplification still allowed for enough conceptual questions to be asked so that the whole project team was busy answering them. That the split up into two groups of modalities (two natures in the Dual Nature approach) can be justified in a Dooyeweerdian perspective can be shown as follows.

For an entity to be a subject in the lower modalities does not require it to have intentions, but for the higher modalities having intentions is necessary for being a subject (and this is only the case for humans; in those aspects artifacts can only be objects in intentional relationships of which humans are the subject and ascribe functions to the artifact). Intentionality is an important distinguishing feature between the two natures. (Stellingwerff¹⁹ unfortunately only refers to Meijers' use of the term 'relational' in this respect; in other publications,²⁰ though, the term intention is used, for example when the Dual Nature researchers discuss the idea of designer and user plans). As we see this fits well with Dooyeweerd's approach²¹ to the subject and object functions in the various modalities (see my remark above about aspects and intentions). Hence I see no fundamental difficulties in reading the Dual Nature approach with an ontological pair of glasses, and still being far removed from dualism.

When Meijers and Kroes write about the challenge to designers to bridge the gap between the physical and the functional nature of an artifact²² (in design), Stellingwerff accuses them of trying to solve a problem after first having created it in an artificial way. By creating a dualist vision on the technical artifact one meets the problem of having to reconcile the two natures again. However, as I have argued above, the difference between the two natures for the Dual Nature researchers is in the first place a matter of know-

¹⁸ Mitcham, Carl, 'Do Artifacts Have Dual Natures? Two Points of Commentary on the Delft Project', *Techné* 6: 9-12.

¹⁹ Stellingwerff 2004, p. 89.

²⁰ For example: Houkes, W.N., 'The proper use of technical artifacts: an intentional view', unpublished conference paper for the 12th Biennial International Conference of the Society for Philosophy of Technology, July 10, 2001, at the University of Aberdeen (UK); Vermaas, P.E. and Houkes, W.N., 'Ascribing functions to technical artifacts: a challenge to etiological accounts of functions', *British Journal for the Philosophy of Science*, 54: 261-289.

²¹ With slight modification, as indicated in footnote 17.

²² Kroes, P.A. and Meijers, A.W.M., 'Introduction: a discipline in search of its identity', in: Kroes, P.A. and Meijers, A.W.M. (eds.), *The Empirical Turn in the Philosophy of Technology*, Amsterdam: JAI Press.

ing the artifact from two different perspectives. In that respect my experience with designers in business corporations is indeed that they struggle with the 'translation' of what customers want (stated in terms of desired functions), and what is available in terms of technical materials, structures and processes. Nowadays, there are even special methods to help designers make this 'translation', such as the method Quality Function Deployment. The heart of the method is a matrix of which the rows contain the customers' requirements and the columns contain the technical properties of the artifact (like size, weight, colour, or whatever may be relevant for that particular design). For each customer requirement the designers identify to what extent it is related to each of the technical properties (for this measured correlations can be used, but normally one uses simple scores such as 0, 1, 3 and 9 for the different strengths of relationships). Is this not exactly what Meijers and Kroes called building the bridge between the physical (in the rows) and the functional (in the columns) nature? Apparently the problem is not as artificial as Stellingwerff suggests. Current practice in engineering design seems to suggest that the fit between a desired functional nature and possible realizations of a physical nature is exactly what designers seek.

Does all this mean that reformational philosophers can without any hesitation embrace the Dual Nature approach? I am pleased that I can write this from an independent standpoint, as I am not myself involved in the Dual Nature project. Of course we can put questions to the Dual Nature approach. In the first place we can agree with Carl Mitcham's previously cited remark²³ that the complexity of reality is greatly reduced in the Dual Nature approach, and that the complexity of engineering design is not fully done justice. Also the Dual Nature lacks any reference to the underlying worldview, of which Dooyeweerd has shown that somehow it always has a religious dimension. When quoting Meijers and Kroes, Stellingwerff mentions what they call their 'conceptualisation' of the world. Stellingwerff translates this as their 'worldview'. I think the latter term has a much deeper connotation than what Kroes and Meijers call 'conceptualisation'. In fact the question what worldview is underneath the Dual Nature approach has not been answered yet, if at all there is a worldview shared by all researchers in the program; a number of them are confessing Christians, others are not. It would perhaps be more worthwhile to start the discussion there than to criticize the Dual Nature program for being dualist.

²³ See footnote 18.