



## Hot Debate: Obscuring Design Philosophy through the Misuse of Physics

Anders Rønnau

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# Hot Debate

## Obscuring Design Philosophy through the Misuse of Physics

### Anders Rønnau

**Anders Rønnau earned a Ph.D. in Applied Physics at the University of Aarhus in Denmark in August 2003 and is now a Master's student at Denmark's Design School. He has published two articles in the prestigious natural science journal, *Science*.<sup>3</sup>**

*Design Philosophy Papers* published an article by John Wood, 'Designing Clocks to Sustain Synergy' (DPP 5, 2003) on the notion of design time. While the article included several interesting observations about the subject, Wood supported his observations with an apparent structure of scientific claims anchored in physics and he used the appearance of science to bolster the credibility of his ideas. As a person with feet in two fields – science and design – I read the article with interest. I am in the unusual situation of being both a physicist and a design student. I earned my Ph.D. in physics before entering Denmark's Design School as a master's student in design.

Mr. Wood has astonished me by ignoring all the requirements of a scientific research paper. The author substitutes anecdotes for evidence in a way that tends to confuse and lose the reader. Scientists do tell stories to narrate the development of a research concept, but this is a form of storytelling related to the evidence at hand and to the history of the field. The Wood article consisted only of Wood's own stories, supported by excessive self-referencing and on the whole having very few references to external evidence.

Wood introduces his article with eight specific problems and promises. He finishes without returning to the initial problems and without keeping a single promise. Along the way the authors' arguments are often misleading, and he ends without a conclusion. The problem that I address here involves using the natural sciences to support and argument for artistic work without understanding the physics behind the claims it makes.

An example is the statement that Newton introduced the idea of "relativistic time." This kind of claim adds nothing to the understanding of the article without a serious explanation with references. As a published physicist, I know the literature of my field and I have added to it myself. It was news to me that Newton introduced the concept of relativistic time. If he did, I need to know where he introduced the concept, why, and in what context. What did he mean by it, and how does John Wood use this concept in the current context? It is important to demonstrate a clear and explicit chain of reasoning linking Newton's findings to Wood's conclusions.

Was Newton's time universal or was it relativistic? I would say it was universal. Newton argued that time was universal and absolute. He saw space in the same way. He believed that time and space established rigid coordinates against which we can measure all other activities. It is possible to read both versions in this the article without backing or references for either claim.

The artistic polemic of the text also makes odd use of common scientific terms. The way that the author presents Cartesian coordinates is an example of this. Why Cartesian coordinates? Coordinates are coordinates. The notion of Cartesian coordinates pretty much covers all coordinate systems that are in use outside abstract theoretical mathematics. Cartesian coordinates designate all rectangular coordinate systems where the different coordinates do not affect each other. This means that you can change the position of an object along the x-axis without changing its position in the y-axis. Rene Descartes introduced this type of geometry in the early 1630s.<sup>1</sup>

While Wood's 'Lover's Clock' may be interesting, several problems obscure the clock. Wood fails to describe the apparently simple dynamics of the clocks in a clear way. He should have given more attention to describing this part of the thought experiment he presents. This might have given a clearer picture of his points with the clocks. It would also have rendered the misuse of physics in this article superfluous.

Wood's presentation of the dynamics involved in his Lover's Clock is so unclear that it is impossible to comment on the mechanism. Not even the original article that Wood self-cites explains the Lover's Clock. What the vague explanation does offer is an apparent reference to Albert Einstein's well-known Twin Paradox, and mentioning Einstein in the paragraph reinforces the link.

Wood uses several formulas that supposedly explain the physics in detail. Unfortunately, they do not do so.

The first formula does not use correct units of physical measurement, and none of the formulas is related to Einstein's special theory of relativity. Instead, the formulas may refer to Doppler's work.<sup>2</sup> Doppler's work explains frequency changes that occur when something moves towards or away from a given observer, as we know it when an ambulance is speeding past us. The Doppler formulas only describe phenomena happening at speeds nowhere near the speed of light.

The text explaining the different constants and variables in the formulas raise even more questions. To a physicist,  $c$  can only be the speed of light. Every physicist in the world uses this constant. It is the well-known " $c$ " in Einstein's famous formula,  $E = mc^2$ . Wood creates his own meaning for  $c$ , defining it as "the speed of the surrounding medium." A physicist must wonder what he means. What is "the speed of the surrounding medium"? Is "the surrounding medium" the air – or is it "the aether"?

If Wood's physics represented speeds in the speed of light regime, the formulas would look very much different. Either way, the author's comments on the "combined speed" equalling the speed of light – and causing the entire universe to stop (!) – demonstrates that Wood does not understand the fundamental issues in Einstein's work.

The relevant physics could probably have been stated in a few simple formulas, but the problem is bigger than that. The biggest problem with these formulas is that they do not give a better understanding of Wood's points.

This fact renders the physics in this article entirely irrelevant. A simple explanation of the physics would have given a better and clearer understanding of Wood's ideas. The typical reader of the article has no chance of understanding even the simplest of these formulas, not even if they were correct. Whether or not he realizes that his physics is wrong, Wood must know that most readers cannot follow the arguments represented in the form of these formulas. This suggests that the formulas are used to impress the reader and add false weight to Wood's claims.

John Wood's article could have been as interesting contribution to understanding how the act of measuring time influences our culture and controls our lives. The provocative questions of the introduction certainly raise interesting questions. I was hoping to see those questions answered.

While I am inexperienced in the polemics of conceptual art and design research, I do know when an author stands in the way of his own message by killing important points and deliberately obscuring the message to add weight. By publishing an article such as this, *Design Philosophy Papers* enhances John Wood's visibility as an author, while Wood is only repeating

his own work – work that he does not explain any more clearly in the articles he self-cites.

Without a clear purpose, Wood obstructs his own message. This article is flawed by erroneous and superfluous formulas that ape the natural sciences. Wood obstructs the discipline of the philosophy of design by relying heavily on self-citation while failing to provide a comprehensible article. Instead, he clutters his article in an unstructured collage of points which makes it practically impossible to read in any practical sense while claiming too much attention for the fake science that is neither practically nor theoretically sound.

### Notes

1. A good text book for Math 101 is: Edwards & Penney, *Calculus with Analytic Geometry*.
2. A good text book for Physics 101 could be: Kleppner & Kolenkow, *An Introduction to Mechanics*, which explains not only the work by Doppler, but also the special theory of relativity by Einstein.
3. 'Oxygen-Mediated Diffusion of Oxygen Vacancies on the TiO<sub>2</sub>(110) Surface' R. Schaub, E. Wahlström, A. Rønnau, E. Lægsgaard, I. Stensgaard, and F. Besenbacher, *Science* Jan 17 2003: 377–379 and 'Electron Transfer Induced Dynamics of Adsorbed Oxygen Molecules on the TiO<sub>2</sub>(110) Surface' E. Wahlström, E. K. Vestergaard, R. Schaub, A. Rønnau, M. Vestergaard, E. Lægsgaard, I. Stensgaard, and F. Besenbacher, *Science* Jan 23 2004: 511–513.