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# Commentary on Gross

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Commentary on: A. G. Gross' "Scientific Diagrams as Argument: The Example of Darwin"

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The paper *Scientific Diagrams as Argument: The Example of Darwin* is an ingenious and elegant piece of work. It is in fact a spin-off, or rather an important after thought, of a much larger project that has resulted in the publication of the impressive book *Communicating Science: The Scientific Article from the 17<sup>th</sup> Century to the Present*. *Communicating Science*, which appeared in 2002. The ambition of Gross's brief paper, however, is at second sight much greater than it may at first sight appear. Its subtitle, *The Example of Darwin*, involves a clever word play that prevents this ambition from becoming too conspicuous. *The Example of Darwin* can be read as merely referring to the one and only, and therefore quite famous, diagram that Charles Darwin included in *On the Origin of Species*. After having read the paper, however, and having taken in its contents, it becomes clear that much more is at stake. Apart from giving an illuminating analysis of the argumentative function of Darwin's diagram in the *Origin of Species*, Gross uses the Darwin example to substantiate his general vision on the function of images, such as diagrams, as visual arguments in the process of argumentation. The example is then intended to be exemplary, and Gross's ambition involves a more far-reaching claim regarding the concerted use of visual and verbal arguments.

Gross approaches the *Origin of Species* from a rhetorical perspective. He does not engage us in a discussion of the scientific merits of Darwin's arguments, let alone in the current debate between evolutionary thinkers and "creationists." However tempting it may be for an argumentation theorist, especially when he suddenly finds himself at the American side of the Ocean, to bring in Stephen J. Gould and Duane T. Gish, and dive into an analysis of their disputations, this temptation should be resisted because it is off the mark. Gross views the *Origin of Species* as one big attempt at persuasion. His observation that Darwin's image of a tree is to be preferred to the more adequate image of a coral proves this point conclusively. In his *Notebooks*, Darwin writes: "the tree of life should perhaps be called the coral of life, base of branches dead" (p. 177). Gross agrees, but hastens to add: "But for his 19<sup>th</sup> century audience [my italics, FHvE] coral would have lacked the cultural resonance possessed by the tree." This is indeed a rhetorical consideration if I ever saw one. In my opinion, Gross could strengthen his analysis even further by adding that the image of a tree was in the 19<sup>th</sup> century strongly associated with the highly popular genealogical family trees that portray kinship relationships between relatives, dead or alive. This is what I would call strategic maneuvering at its best, and it is fully in line with this observation that Gross speaks of "Darwin's strategy."

Let me first summarize some of the main points of the paper, so that it is clear what my comments relate to. "In its first appearance, [Darwin's] diagram's vertical dimension is," as Gross explains, "time; its horizontal dimension, organic diversity." "The nearer species are along the horizontal dimension, the more likely they are to compete for the same territories and resources in the battle for survival; the more likely they are to become extinct." Apart from being a representation of evolution, Darwin's diagram is, according to Gross, "equally a representation of the [the evolution's] geological record." In the first case, the vertical

dimension is, in his view, "metaphoric: space represents time." In the second case, it is denotative: "space represents only space." "But the geological column is," I am still quoting Gross, "as it were time made visible; therefore the vertical dimension also represents time. Really, it *is* time."

"Darwin's strategy" in the *Origin of Species* is in Gross's analysis "not to rely solely on verbal argument or graphic presentation or metaphorical representation, but to avail himself of *every* available modality of persuasion." If the pragma-dialecticians van Eemeren and Houtlosser are to be believed, Darwin is not alone in trying to exploit all the rhetorical means available in his strategic maneuvering in defense of his view. "As a consequence of this rhetorical assault," Gross concludes, "the visual-textual compound that is the single diagram in Darwin's *Origin* becomes more than a depiction of evolutionary theory; it also becomes an argument in favor of that theory." I am inclined to agree with Gross that this could very well be the case.

Let me end this summary with a general conclusion reached by Gross that I also agree with: "Darwin's diagram and Darwin's texts function together, two semiotic codes that fuse synergistically to create the meaning and enhance the significance of the *Origin of Species*."

I would like to add a few notes, inspired by this excellent essay, that react to Gross's portrayal of the diagram as "a component that is part of the 'one and long' argument that Darwin's book [in his opinion] is." My notes pertain to some principles regarding the relations between language and the expression of thought and mental states, the relation between visual images and verbal argumentation, and the relation between visual images and persuasive force.

#### (1) *Language and the expression of thought and mental states*

Gross says that the Darwin diagram is so complex that it takes a whole book to explain. But fortunately, providing such a verbal explanation is perfectly possible. Gross himself proves the point! Therefore it cannot simply be the case that Gross doubts the so-called *Principle of Expressibility*. This Principle, as explained by John Searle and a great many other authors, says that anything that can be meant can be expressed in language. Together with the so-called *Principle of Immanent Productivity*, which explains that every "natural" language system [not just the Dutch language] is capable of accommodating all "new needs" of the language users, such as constructing new words for concepts that were not known before. If Gross would have any doubts about these Principles, his own lucid explanation of Darwin's diagram and theory proves that he is wrong.

#### (2) *Visual images and verbal argumentation*

Nevertheless, Gross claims – and I agree – that visual images such as diagrams can be part of an argument. I agree, and therefore I automatically agree with his next claim that no argument theory that omits such visual arguments can be called complete. Because the first claim is correct, the second claim is in fact superfluous.

All the same, first comes first, and this also goes for argumentation theory. Most argumentation is delivered verbally, especially if it gets more complex. It is therefore understandable that argumentation theorists have concentrated in the first place on verbal argumentation, even neglecting non-verbal argumentation, as most of us did in the past, in their definitions. It is certainly not for nothing that Gross, when including visual arguments in his conception of argumentation, first observes that it is legitimately "to stretch [please, note the use of the word *stretch*] the meaning of argument" in this way.

I have no difficulty in recognizing the role images can play in argumentation. The question that needs to be answered then, however, is – just like when you include other forms of non-verbal actions in your theory of argumentation – how to accommodate them in the

analysis. In the case of visual argumentation, interesting proposals to answer this question have been made by Blair (1996), Groarke (2002), and several others.

Generally speaking, the concept of visual argumentation seems to be more easily acceptable to communication scholars, who are used to dealing with visual communication, than to logicians and other analytically minded argumentation scholars. In case of visual argumentation, just as in that of verbal argumentation, the analysis always requires a "translation" in some kind of propositional system – or in a pragmatic propositional system that also incorporates communicative forces or functions. In this connection, it is strange to notice that Gross blames the [I quote from his paper] "relentless focus of philosophers of science on sentences and their underlying propositions" for the little attention they have paid to Darwin's diagram. If the emphasis is here on the focus on *sentences*, I fully agree but do not see why the addition "and their underlying propositions" is made. But if the emphasis is on the focus on *underlying propositions*, then on this point Gross and I perhaps do not really agree, after all.

By nature, visual argumentation has its limitations. Therefore it is understandable that Gross adds immediately to his claim that Darwin's diagram is so complex that it takes a whole book to unfold its meaning: "Necessarily, Darwin's diagram falls short of depicting the complexity of the processes involved." As Reidy says in personal correspondence with Gross: "Darwin needs the rest of the book, not only to explain the diagram, but to explain to his readers the complexity of the process that is missing from the diagram." I am not surprised. This is how it goes with diagrams and formalisms. In the end, you need as a rule verbal communication to explain and argue the case.

Gross says: "We can see the argumentative value of graphic presentation [mark the generality of the claim!] when we compare Darwin's diagram with its verbal 'equivalent.'" Darwin ends the chapter in which the diagram appears with the extended simile based on the analogy between evolutionary development and the growth of a tree." As Gross observes: "Up to a point, the comparison holds." Yes, this is always the case with comparisons: in the end they go wrong. This does not mean, however, that the image concerned could not have been expressed in words. Gross rightly observes: "the argument from analogy soon outwears its theoretical and expository welcome. In the verbal expansion, disanalogy undermines Darwin's theoretical purpose." Here, Gross appears to turn a disadvantage into an advantage, just like formalists tend to do. In this respect, the function of "minimalism" may be compared very well with that of formalism. The diagram represents only those characteristics of a tree that serve Darwin's theoretical purpose.

### (3) *Visual images and persuasive force*

It goes without saying that in some cases a drawing or other visual image can make one's point clear more convincingly than a long verbal chain of arguments. All the same, a verbal image has its limitations. Gross, too, indicates that in the case of Darwin, just as in the case of formalization, crucial points that are to be emphasized are highlighted. Just as in the case of formalization, this happens at the expense of other aspects. According to Gross, "It is crucial that the diagram has gone half-way to meet theory, divesting itself in the process of those features that facilitate pattern recognition." Most other features remain obscure. Darwin (p. 119) admits that in his diagram "the line of succession is broken at regular intervals [...] marking the successive forms that have become sufficiently distinct to be recorded as varieties. But these breaks [are imaginary, and] might have been inserted anywhere [...]" Darwin cannot refrain from adding this, because it does not become clear in the diagram. Gross provides some more verbal elucidation: "Despite their individuation as points, species are not real; even the lines of divergence are conjectural; they are *dotted* lines. Only the processes that create divergence are real." And processes are hard to draw. Furthermore, the

time scale of evolutionary change may vary considerably from species to species. As Gross observes: "This variation in time scale and, consequently, in the span of evolutionary change blurs distinctions between species and variety, genus and species. In effect, Darwin turns the diagram into an argument for these intellectual leaps." I wonder, however, how you can see this in the diagram.

Or is it perhaps so that images have some *extra persuasive force* compared to verbal arguments? If this is indeed the case, Gross may be entirely right with regard to Darwin's rhetorical efforts (and perhaps their effects). But it could be otherwise. To explain their argumentative force, they must at any rate be given some kind of propositional translation, such as Gross provides. Otherwise there has to be some separate visual faculty in people's mind that is completely different from the cognitive faculty of dealing with argumentation as it has so far been approached and examined.

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