In the *Private Thoughts* (1619-1622), Descartes stipulates that “man has knowledge of natural things only through their similarity [*per similitudinem*] to the things which come under the senses. Indeed, our estimate of how much truth a person has achieved in his philosophizing will increase the more he has been able to propose some similarity between what he is investigating and the things known by the senses” (AT X 218-19, CSM I 5; modified). By this measure, Descartes became a very accomplished philosopher, for in his published and unpublished work he frequently uses analogies between what comes “under the senses” and “natural things.” Specifically, Descartes’ analogies identify similarities between the effects of observable phenomena and processes – whose causes we know – and natural effects – whose causes we do not know. By way of the analogy, in his physics Descartes claims to discover or makes plausible the existence of specific unobservable natural causes.

Although analogical reasoning is just one component of Descartes’ scientific method, which may be characterized as a version of hypothetical-deduction minus careful confirmation (see Clarke 1982; Sakelleriadis 1982; and McMulllin 2008 and 2009), it is with his analogies that Descartes bridges the gap between the world of experience and the moving and colliding particles that explain the effects we observe. Yet Descartes rarely used the Latin from which our “analogy” derives, let alone its French cognate “*analogie*” (cf., AT XI 158; see Galison 1984). The analogies from the *Dioptrics* (1637) that I discuss below are “comparisons [*comparaisons*]” and those from the *Meteorology* (1637) are instances of reasoning by “example and similarity [*exemplum & similitudinem*]” (Ibid., VI 83 and I 422, respectively). In the *Principles* (1644)
analogy are typically “comparisons [comparationes]” or efforts to “compare [consero/comparo]” (e.g., Ibid., VIII 87 and 110, respectively). And, in the famous Proposition 8 from the *Rules for the direction of the mind* (1620s), Descartes’ method does not involve seeking “analogy” but advises us to “enumerate all the other natural powers so that, by means of knowledge of some other one, [we] might come to understand [the action of light]..., at least by imitation [imitationem]” (Ibid, X 395).

Descartes’ first public expression of his scientific views in 1637 gives analogy a prominent role in physics, one that would resurface again and again in his later work, especially parts two and three of the *Principles*. When discussing light in the *Dioptrics*, for example, Descartes likens visual sensation to the sensory experience of blind men who “see with their hands” in order to make plausible his hypothesis that light is “nothing other than a certain movement, or very rapid and lively action, which passes to our eyes through the medium of the air and other transparent bodies.” He goes on in the *Dioptrics* to analogize light’s propagation to the movement of fermenting wine within a vat – which helps us understand instantaneous propagation in all directions – and to tennis balls ricocheting off a surface or breaking through a sheet – which makes plausible a materialist account of light’s reflection and refraction (AT VI 83ff, CSM I 153-164). In the *Meteorology*, Descartes even uses an analogy between a raindrop and a round “flask” filled with water in order to facilitate his optical experiments (AT VI 325).

One of Descartes readers, Jean-Baptiste Morin, recognized Descartes’ reliance on analogy in the *Discourse* and its companion essays. In 1638 Morin challenged Descartes’ use of analogies (AT II 291 and 297). In response, Descartes concedes that he had used analogies to answer difficult questions in physics but then he offers a strong defense of this strategy:
True, the comparisons \( \textit{comparaisons} \) that are usually employed in the Schools explain intellectual matters by means of physical ones, substances by means of accidents, or at any rate, one quality by means of a quality of a different kind, and they are not very. But in the comparisons \( \textit{pource qu’en celles} \) which I employ, I compare motions only with other motions, or shapes with other shapes; that is, I compare things that are too small to be perceived by the senses with other things that can be so perceived, the latter differing from the former simply as a large circle differs from a small one. I maintain, therefore, that comparisons of this sort are the most appropriate means available to the human mind for laying bare the truth in problems of physics. I would go so far as to say that, when someone makes an assertion concerning nature which cannot be explained by any such comparison \( \textit{qui ne peut ester expliquée par aucune telle comparaison} \), I think I have demonstrative knowledge that the point is false. (AT II367-68, CSMK 122; modified)

Descartes is making two noteworthy claims about his analogies in this passage. First, he is insisting that his analogies provide sufficient evidence for making a causal claim. Specifically, they are informative and relevant because all the analogs are confined to the same ontological category. What remains unstated in the letter to Morin, just as it was unstated in the \textit{Discourse’s} companion essays, is Descartes’ famous ontology which identifies matter as mere extension. Using analogies to make inferences to unobserved causes will not lead to false generalizations – including generalizations about the scope of the laws of nature – because we are simply
Comparing one instance of extension with another, which is not unlike comparing “a large circle... [to] a small one”.

Second, Descartes insists that analogies are also necessary in physics. That is, lacking an analogy of the sort he advocates, Descartes believes that we have a definitive reason to reject any proposed causal explanation; i.e., the cited cause is either non-existent or outside of nature. This suggestion is especially unacceptable to Morin, whose deep disagreement is evident in his next letter to Descartes (AT II 411). But what Morin never came to understand is that Descartes’ view is not, simply, where there is a cause there will be an analogy. Rather, Descartes’ view is that where there is just extension there will always be an analogy to aid in the discovery of an unknown cause or to show the plausibility of a given cause.

Descartes would go on to make this last point again in the *Principles*, but his ontology would be more explicit:

> I... acknowledge that I recognize no matter in corporeal things apart from that which the geometers call quantity... i.e. that to which every kind of division, shape and motion is applicable. Moreover, my consideration of such matter involves absolutely nothing apart from these divisions, shapes and motions.... And since all natural phenomena can be explained in this way... I do not think that any other principles are either admissible or desirable in physics. (CSM I 247).

If something is entirely unlike shape, size or motion, it will not enter into Descartes’ physics. Whereas Morin, like the scholastics, accepts a plurality of ontological categories and even occult qualities, Descartes does not. For Descartes, explanations without possible analogs elsewhere in
nature run afoul of an immediate consequence of the metaphysics that is the foundation of his physics.

In the years after his death Descartes’ analogies were ridiculed as instances of his worst “speculative” inclinations and wholly without merit when observation and experimental science became the benchmark of the best science. Advances in microscopy alone were enough to undermine the particular claims Descartes had used his analogies to support. To Descartes’ early detractors then, his analogies typified everything that was wrong with Descartes’ scientific method, which was resistant to sensory evidence and constrained only by the limits of his imagination and his deluded faith that he saw clearly and distinctly into how nature functions (see Lauden 1966 and especially Anstey 2005). But as imaginative and implausible as Descartes’ analogies often are, in truth they are just one by-product of a metaphysical physics where the identity of extension and matter serves to constrain admissible truths and practices.

The extensive role metaphysics played in supporting Descartes’ use of analogy might suggest that we should take as negative a view of Descartes’ analogies as we now take of his metaphysics, but our final judgment of the role he assigned to analogies should not be entirely negative. In fact, the epistemic virtues of unity and simplicity touted by philosophers and scientists today support Descartes’ belief that lacking an analogy between a proposed cause and other causes in nature requires us to make a choice. We must choose between endorsing the existence of the new cause or maintaining the ideals of unity and simplicity. If we are willing to allow these ideals to go proxy for Descartes’ metaphysics, though Descartes himself seems to have done just the opposite, we can see that science has remained deeply Cartesian. And even if Descartes proved willing to judge in favor of these ideals to the point of rejecting the obvious
limits of what he could claim to know, his use of analogy, though not his specific analogies, is both well conceived and defensible (see Manning, Statile 1999).

**Further Reading**


**Extrinsic Denomination**

Denominatio is the substantivized form of denominative, which was the Latin translation of Aristotle’s παρώνυμα, from which we also derive the English “paronym” (Aristotle, *Categories* I.1a13-14). “Extrinsic denomination” (extrinseca denominatio) refers to instances of naming where a relation that a thing bears to something outside itself supports using the name, while an “intrinsic denomination” is an instance of naming where a property of the thing itself is the support (see, e.g. Thomas Aquinas, *Contra gentiles* II.13). References to intrinsic and extrinsic denominations frequently appear in scholastic disputes over the names attributed to both God and his creation – do names mean the same thing when predicated of the two? Less controversial was Aristotle’s example of “healthy.” An animal is intrinsically denominated “healthy” because health belongs to the animal itself. Food, however, is extrinsically denominated “healthy” because it bears a causal relation to the healthy animal – i.e., it makes the animal “healthy” – and urine was likewise extrinsically denominated “healthy” because it bears a semiotic relation to the healthy animal – i.e. it is a sign of the animal’s health.

This example reveals two further points about extrinsic denomination worth noting. First, in cases of extrinsic denomination there is a primary meaning of a name – e.g., “healthy” when applied to an animal – from which all related uses derive. Little surprise then that extrinsic denominations were identified with analogies, and particularly analogies of attribution or “denominatio per attributionem” (*Suarez*, Disp. XX-VII, Sect III. §4). Second, although there was disagreement over some of the nuances surrounding extrinsic denominations, what remained
constant was the understanding that an extrinsic denomination was not the same as a false attribution. Thus, not only does an extrinsic denomination contrast with an intrinsic denomination, it also contrasts with arbitrary or purely contingent acts of naming.

In Descartes’ work, “extrinsic denomination” makes two appearances – one in Meditation Six and the other in the Objections and Replies in response to Caterus’ worries over “objective being” (AT VII 85 and 102; respectively). In both cases, Descartes shows himself well aware of the meaning of “extrinsic denomination.” Consider just Meditation Six, where Descartes discusses the predication of “nature.” It is his view that whenever “nature” implies the possibility of error or privation in a body it must be a case of “extrinsic denomination” (AT VII 85). Of course, we are inclined to talk about malfunctions and failures generally with respect to machines, but the intrinsic properties of a body and the laws of nature governing its states do not allow for this (AT VII 84ff., CSM II 58). To explain the denomination of “nature,” therefore, Descartes argues that we apply “nature” to a machine owing to the relation the machine bears to the ideas of its creator. (Presumably, the “nature” of the machine represented in the ideas of its creator is intrinsically denominated in the idea even though it is, strictly speaking, external to the machine itself.)

Descartes adopts a more complicated position with respect to the human body. It too is extrinsically denominated with a “nature” capable of error and privation, but now it is a relation to the intrinsically denominated “nature” of a composite human being, and not to the ideas of its creator, that supports the denomination of “nature” (AT VII 85, CSM II 59). Precisely what this relation is is far from clear in the text of Meditation Six and how we understand the relation will have implications for our understanding of the union. I would suggest that the relation is a product of abstraction. That is, the human body is an abstraction from the composite human
being. Where all this leaves the “nature” of animals and other living things in Descartes remains a subject of great controversy.

**For Further Reading**

**Primary Sources:**


**Secondary Sources:**


