



René Descartes

René Descartes (/deɪˈkɑːrt/ *day-KART* or UK: /ˈdeɪkɑːrt/ *DAY-kart*; French: [ʁəne dekaʁt] ; ^[note 3]^[11] 31 March 1596 – 11 February 1650)^[12]^[13]:58 was a French philosopher, scientist, and mathematician, widely considered a seminal figure in the emergence of modern philosophy and science. Mathematics was paramount to his method of inquiry, and he connected the previously separate fields of geometry and algebra into analytic geometry. Descartes spent much of his working life in the Dutch Republic, initially serving the Dutch States Army, and later becoming a central intellectual of the Dutch Golden Age.^[14] Although he served a Protestant state and was later counted as a deist by critics, Descartes was Roman Catholic.^[15]^[16]

Many elements of Descartes' philosophy have precedents in late Aristotelianism, the revived Stoicism of the 16th century, or in earlier philosophers like Augustine. In his natural philosophy, he differed from the schools on two major points. First, he rejected the splitting of corporeal substance into matter and form; second, he rejected any appeal to final ends, divine or natural, in explaining natural phenomena.^[17] In his theology, he insists on the absolute freedom of God's act of creation. Refusing to accept the authority of previous philosophers, Descartes frequently set his views apart from the philosophers who preceded him. In the opening section of the *Passions of the Soul*, an early modern treatise on emotions, Descartes goes so far as to assert that he will write on this topic "as if no one had written on these matters before." His best known philosophical statement is "*cogito, ergo sum*" ("I think, therefore I am"; French: *Je pense, donc je suis*), found in *Discourse on the Method* (1637, in French and Latin, 1644) and *Principles of Philosophy* (1644, in Latin, 1647 in French).^[note 4] The statement has either been interpreted as a logical syllogism or as an intuitive thought.^[18]

René Descartes



Portrait after Frans Hals^[note 2]

Born	<div> <div>31 March 1596</div> <div>La Haye en Touraine, Touraine, Kingdom of France (now Descartes, Indre-et-Loire)</div> </div>
Died	<div> <div>11 February 1650 (aged 53)</div> <div>Stockholm, Swedish Empire</div> </div>
Education	<div> <div>Collège Royal Henry-Le-Grand (1607–1614)</div> <div>University of Poitiers (LL.B., 1616)</div> <div>University of Franeker (no degree)</div> <div>Leiden University (no degree)</div> </div>
Children	<div> <div>Francine Descartes</div> </div>
Era	<div> <div>17th Century</div> <div>Age of Enlightenment</div> </div>
Region	<div> <div>Western philosophy</div> <div> <div> <div>Dutch philosophy</div> <div>French philosophy</div> </div> </div> </div>
School	<div> <div>Rationalism</div> <div>Cartesianism</div> <div>Mechanism</div> <div>Innatism^[1]:257</div> </div>

Descartes has often been called the father of modern philosophy, and is largely seen as responsible for the increased attention given to epistemology in the 17th century.^{[19][note 5]} He laid the foundation for 17th-century continental rationalism, later advocated by Spinoza and Leibniz, and was later opposed by the empiricist school of thought consisting of Hobbes, Locke, Berkeley, and Hume. The rise of early modern rationalism—as a systematic school of philosophy in its own right for the first time in history—exerted an influence on modern Western thought in general, with the birth of two rationalistic philosophical systems of Descartes (Cartesianism) and Spinoza (Spinozism). It was the 17th-century arch-rationalists like Descartes, Spinoza, and Leibniz who have given the "Age of Reason" its name and place in history. Leibniz, Spinoza,^[20] and Descartes were all well-versed in mathematics as well as philosophy, with Descartes and Leibniz additionally contributing to a variety of scientific disciplines.^[21]

Descartes' *Meditations on First Philosophy* (1641) continues to be a standard text at most university philosophy departments. Descartes' influence in mathematics is equally apparent, being the namesake of the Cartesian coordinate system. He is credited as the father of analytic geometry—used in the discovery of infinitesimal calculus and analysis. Descartes was also one of the key figures in the Scientific Revolution.

Life

Early life

René Descartes was born in La Haye en Touraine, Province of Touraine (now Descartes, Indre-et-Loire), France, on 31 March 1596.^[22] In May 1597, his mother Jeanne Brochard, died a few days after giving birth to a still-born child.^{[23][22]} Descartes' father, Joachim, was a member of the Parlement of Rennes at Rennes.^{[24]:22} René lived with his grandmother and with his great-uncle. Although the Descartes family was Roman Catholic, the Poitou region was controlled by the Protestant Huguenots.^[25] In 1607, late because of his fragile health, he entered the Jesuit Collège

Foundationalism^[2]

Conceptualism^{[3]:43}

Augustinianism^[4]

Indirect realism^{[5]:136}

Correspondence theory of truth^[6]

Corpuscularianism^[7]

Theological voluntarism^[note 1]

Thesis

Untitled LL.B. thesis (<https://plato.stanford.edu/entries/descartes-works/tlatin.html>) (1616)

Main interests

Epistemology, metaphysics, mathematics, physics, cosmology, ethics

Notable ideas

See list

Cogito ergo sum

Method of doubt

Subjectivity

Method of normals

Analytic geometry

Cartesian coordinate system

Imaginary number

Mind–body problem

Cartesian dualism

└ Interactionism

└ Trialism

Cartesian circle

Foundationalism

Mathesis universalis

Folium of Descartes

Deus deceptor^[9]

Dream argument

Conservation of momentum

(*quantitas motus*)

Balloonist theory

Descartes' Rule of Signs

Wax argument

Trademark argument

Causal adequacy principle

Res cogitans/res extensa

distinction

Conatus

Signature



Royal Henry-Le-Grand at La Flèche,^{[26][27]} where he was introduced to mathematics and physics, including Galileo's work.^{[28][29]} While there, Descartes first encountered hermetic mysticism. After graduation in 1614, he studied for two years (1615–16) at the University of Poitiers, earning a *Baccalauréat* and *Licence* in canon and civil law in 1616,^[28] in accordance with his father's wishes that he should become a lawyer.^[30] From there, he moved to Paris.

In *Discourse on the Method*, Descartes recalls:^{[31]:20–21}

I entirely abandoned the study of letters. Resolving to seek no knowledge other than that of which could be found in myself or else in the great book of the world, I spent the rest of my youth traveling, visiting courts and armies, mixing with people of diverse temperaments and ranks, gathering various experiences, testing myself in the situations which fortune offered me, and at all times reflecting upon whatever came my way to derive some profit from it.

Army service

In accordance with his ambition to become a professional military officer in 1618, Descartes joined, as a mercenary, the Protestant Dutch States Army in Breda under the command of Maurice of Nassau,^[28] and undertook a formal study of military engineering, as established by Simon Stevin.^[32] Descartes, therefore, received much encouragement in Breda to advance his knowledge of mathematics.^[28] In this way, he became acquainted with Isaac Beeckman,^[28] the principal of a Dordrecht school, for whom he wrote the *Compendium of Music* (written 1618, published 1650).^[33]

While in the service of the Catholic Duke Maximilian of Bavaria from 1619,^[34] Descartes was present at the Battle of the White Mountain near Prague, in November 1620.^{[35][36]}

According to Adrien Baillet, on the night of 10–11 November 1619 (St. Martin's Day), while stationed in Neuburg an der Donau, Descartes shut himself in a room with an "oven" (probably a cocklestove)^[37] to escape the cold. While within, he had three dreams,^[38] and believed that a divine spirit revealed to him a new philosophy. However, it is speculated that what Descartes considered to be his second dream was actually an episode of exploding head syndrome.^[39] Upon exiting, he had formulated analytic geometry and the idea of applying the mathematical method to philosophy. He concluded from these visions that the pursuit of science would prove to be, for him, the pursuit of true



Coat of arms of the Descartes family.



The house where Descartes was born in La Haye en Touraine



Graduation registry for Descartes at the University of Poitiers, 1616

wisdom and a central part of his life's work.^{[40][41]} Descartes also saw very clearly that all truths were linked with one another, so that finding a fundamental truth and proceeding with logic would open the way to all science. Descartes discovered this basic truth quite soon: his famous "I think, therefore I am."^[42]

Career

France

In 1620, Descartes left the army. He visited Basilica della Santa Casa in Loreto, then visited various countries before returning to France, and during the next few years, he spent time in Paris. It was there that he composed his first essay on method: *Regulae ad Directionem Ingenii* (*Rules for the Direction of the Mind*).^[42] He arrived in La Haye in 1623, selling all of his property to invest in bonds, which provided a comfortable income for the rest of his life.^{[43][44]:94} Descartes was present at the siege of La Rochelle by Cardinal Richelieu in 1627 as an observer.^{[44]:128} There, he was interested in the physical properties of the great dike that Richelieu was building and studied mathematically everything he saw during the siege. He also met French mathematician Girard Desargues.^[45] In the autumn of that year, in the residence of the papal nuncio Guidi di Bagno, where he came with Mersenne and many other scholars to listen to a lecture given by the alchemist, Nicolas de Villiers, Sieur de Chandoux, on the principles of a supposed new philosophy,^[46] Cardinal Bérulle urged him to write an exposition of his new philosophy in some location beyond the reach of the Inquisition.^[47]

Netherlands

Descartes returned to the Dutch Republic in 1628.^[38] In April 1629, he joined the University of Franeker, studying under Adriaan Metius, either living with a Catholic family or renting the Sjaerdemaslot. The next year, under the name "Poitevin", he enrolled at Leiden University, which at the time was a Protestant University.^[48] He studied both mathematics with Jacobus Golius, who confronted him with Pappus's hexagon theorem, and astronomy with Martin Hortensius.^[49] In October 1630, he had a falling-out with Beeckman, whom he accused of plagiarizing some of his ideas. In Amsterdam, he had a relationship with a servant girl, Helena Jans van der Strom, with whom he had a daughter, Francine, who was born in 1635 in Deventer. She was baptized a Protestant^{[50][51]} and died of scarlet fever at the age of 5.

Unlike many moralists of the time, Descartes did not deprecate the passions but rather defended them;^[52] he wept upon Francine's death in 1640.^[53] According to a recent biography by Jason Porterfield, "Descartes said that he did not believe that one must refrain from tears to prove oneself a man."^[54] Russell Shorto speculates that the experience of fatherhood and losing a child formed a turning point in Descartes' work, changing its focus from medicine to a quest for universal answers.^[55]

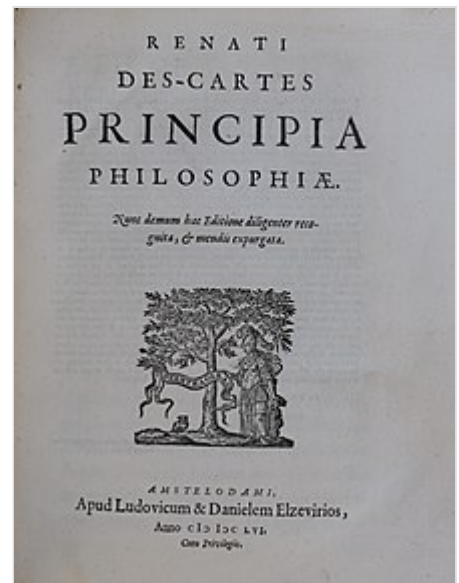
Despite frequent moves,^[note 6] he wrote all of his major work during his 20-plus years in the Netherlands, initiating a revolution in mathematics and philosophy.^[note 7] In 1633, Galileo was condemned by the Italian Inquisition, and Descartes abandoned plans to publish *Treatise on the World*, his work of the



In Amsterdam, Descartes lived at Westermarkt 6 (Maison Descartes, left).

previous four years. Nevertheless, in 1637, he published parts of this work in three essays:^[56] "Les Météores" (The Meteors), "La Dioptrique" (Dioptrics) and *La Géométrie* (Geometry), preceded by an introduction, his famous *Discours de la méthode* (*Discourse on the Method*).^[56] In it, Descartes lays out four rules of thought, meant to ensure that our knowledge rests upon a firm foundation.^[57]

The first was never to accept anything for true which I did not know to be such; that is to say, carefully to avoid precipitancy and prejudice, and to comprise nothing more in my judgment than what was presented to my mind so clearly and distinctly as to exclude all ground of doubt.



Title page of "*Principia philosophiae*" (Principles of Philosophy), 1656

In *La Géométrie*, Descartes exploited the discoveries he made with Pierre de Fermat. This later became known as Cartesian Geometry.^[58]

Descartes continued to publish works concerning both mathematics and philosophy for the rest of his life. In 1641, he published a metaphysics treatise, *Meditationes de Prima Philosophia* (*Meditations on First Philosophy*), written in Latin and thus addressed to the learned. It was followed in 1644 by *Principia Philosophiae* (*Principles of Philosophy*), a kind of synthesis of the *Discourse on the Method* and *Meditations on First Philosophy*. In 1643, Cartesian philosophy was condemned at the University of Utrecht, and Descartes was obliged to flee to the Hague, settling in Egmond-Binnen.

Between 1643 and 1649 Descartes lived with his girlfriend at Egmond-Binnen in an inn.^[59] Descartes became friendly with Anthony Studler van Zurck, lord of Bergen and participated in the design of his mansion and estate.^{[60][61][62]} He also met Dirck Rembrantsz van Nierop, a mathematician and surveyor.^[63] He was so impressed by Van Nierop's knowledge that he even brought him to the attention of Constantijn Huygens and Frans van Schooten.^[64]

Christia Mercer suggested that Descartes may have been influenced by Spanish author and Roman Catholic nun Teresa of Ávila, who, fifty years earlier, published *The Interior Castle*, concerning the role of philosophical reflection in intellectual growth.^{[65][66]}

Descartes began (through Alfonso Polloti, an Italian general in Dutch service) a six-year correspondence with Princess Elisabeth of Bohemia, devoted mainly to moral and psychological subjects.^[67] Connected with this correspondence, in 1649 he published *Les Passions de l'âme* (*The Passions of the Soul*), which he dedicated to the Princess. A French translation of *Principia Philosophiae*, prepared by Abbot Claude Picot, was published in 1647. This edition was also dedicated to Princess Elisabeth. In the preface to the French edition, Descartes praised true philosophy as a means to attain wisdom. He identifies four ordinary sources to reach wisdom and finally says that there is a fifth, better and more secure, consisting in the search for first causes.^[68]

Sweden

By 1649, Descartes had become one of Europe's most famous philosophers and scientists.^[56] That year, Queen Christina of Sweden invited him to her court to organize a new scientific academy and tutor her in his ideas about love.^[69] Descartes accepted, and moved to the Swedish Empire in the middle of winter.^[70] Christina was interested in and stimulated Descartes to publish *The Passions of the Soul*.^[71]



Descartes in conversation with Queen Christina in Stockholm

He was a guest at the house of Pierre Chanut, living on Västerlånggatan, less than 500 meters from Castle Tre Kronor in Stockholm. There, Chanut and Descartes made observations with a Torricellian mercury barometer.^[69] Challenging Blaise Pascal, Descartes took the first set of barometric readings in Stockholm to see if atmospheric pressure could be used in forecasting the weather.^[72]

Death

Descartes arranged to give lessons to Queen Christina after her birthday, three times a week at 5 am, in her cold and draughty castle. However, by 15 January 1650 the Queen had actually met with Descartes only four or five times.^[69] It soon became clear they did not like each other; she did not care for his mechanical philosophy, nor did he share her interest in Ancient Greek language and literature.^[69] On 1 February 1650, he contracted pneumonia and died on 11 February at Chanut.^[73]

"Yesterday morning about four o'clock a.m. has deceased here at the house of His Excellency Mr. Chanut, French ambassador, Mr. Descartes. As I have been informed, he had been ill for a few days with pleurisy. But as he did not want to take or use medicines, a hot fever appears to have arisen as well. Thereupon, he had himself bled three times in one day, but without operation of losing much blood. Her Majesty much bemoaned his decease, because he was such a learned man. He has been cast in wax. It was not his intention to die here, as he had resolved shortly before his death to return to Holland at the first occasion. Etc."^[74]

The cause of death was pneumonia according to Chanut, but peripneumonia according to Christina's physician Johann van Wullen who was not allowed to bleed him.^[75] (The winter seems to have been mild,^[76] except for the second half of January which was harsh as described by Descartes himself; however, "this remark was probably intended to be as much Descartes' take on the intellectual climate as it was about the weather.")^[71]

E. Pies has questioned this account, based on a letter by the Doctor van Wullen; however, Descartes had refused his treatment, and more arguments against its veracity have been raised since.^[77] In a 2009 book, German philosopher Theodor Ebert argues that Descartes was poisoned by Jacques Viogué, a Catholic missionary who opposed his religious views.^{[78][79]} As evidence, Ebert suggests that Catherine Descartes, the niece of René Descartes, made a veiled reference to the act of poisoning when her uncle was administered "communion" two days before his death, in her *Report on the Death of M. Descartes, the Philosopher* (1693).^[80]



(left) The tomb of Descartes (middle, with detail of the inscription), in the Abbey of Saint-Germain-des-Prés, Paris; (right) memorial to Descartes, erected in the 1720s, in the Adolf Fredriks kyrka

As a Catholic^{[81][82][83]} in a Protestant nation, he was interred in the churchyard of what was to become Adolf Fredrik Church in Stockholm, where mainly orphans had been buried. His manuscripts came into the possession of Claude Clerselier, Chanut's brother-in-law, and "a devout Catholic who has begun the process of turning Descartes into a saint by cutting, adding and publishing his letters selectively."^{[84][85]:137–154} In 1663, the Pope placed Descartes' works on the *Index of Prohibited Books*. In 1666, sixteen years after his death, his remains were taken to France and buried in Saint-Étienne-du-Mont. In 1671, Louis XIV prohibited all lectures in Cartesianism. Although the National Convention in 1792 had planned to transfer his remains to the Panthéon, he was reburied in the Abbey of Saint-Germain-des-Prés in 1819, missing a finger and the skull.^[note 8] His alleged skull is in the Musée de l'Homme in Paris,^[86] but some 2020 researches confirm that it may be a forgery. The original skull was probably divided into pieces in Sweden and given to private collector, one of those arriving to the University of Lund in 1691, where it is still preserved.^[87]

Philosophical work

In his *Discourse on the Method*, he attempts to arrive at a fundamental set of principles that one can know as true without any doubt. To achieve this, he employs a method called hyperbolic/metaphysical doubt, also sometimes referred to as methodological skepticism or Cartesian doubt: he rejects any ideas that can be doubted and then re-establishes them in order to acquire a firm foundation for genuine knowledge.^[88] Descartes built his ideas from scratch which he does in *The Meditations on First Philosophy*. He relates this to architecture: the top soil is taken away to create a new building or structure. Descartes calls his doubt the soil and new knowledge the buildings. To Descartes, Aristotle's foundationalism is incomplete and his method of doubt enhances foundationalism.^[89]

Initially, Descartes arrives at only a single first principle: he thinks. This is expressed in the Latin phrase in *the Discourse on Method* "Cogito, ergo sum" (English: "I think, therefore I am").^[90] Descartes concluded, if he doubted, then something or someone



René Descartes at work

must be doing the doubting; therefore, the very fact that he doubted proved his existence. "The simple meaning of the phrase is that if one is skeptical of existence, that is in and of itself proof that he does exist."^[91] These two first principles—I think and I exist—were later confirmed by Descartes' clear and distinct perception (delineated in his Third Meditation from *The Meditations*): as he clearly and distinctly perceives these two principles, Descartes reasoned, ensures their indubitability.

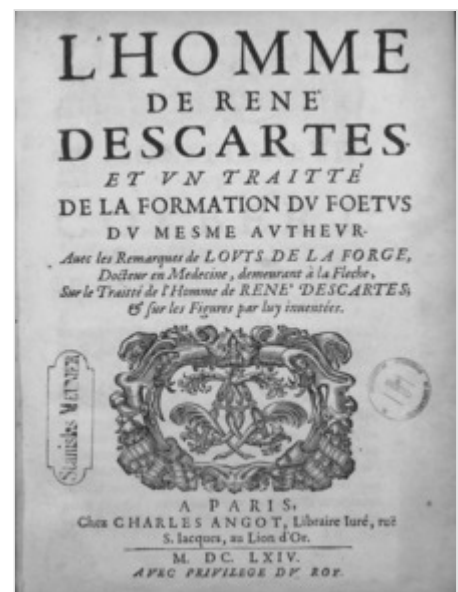
Descartes concludes that he can be certain that he exists because he thinks. But in what form? He perceives his body through the use of the senses; however, these have previously been unreliable. So Descartes determines that the only indubitable knowledge is that he is a *thinking thing*. Thinking is what he does, and his power must come from his essence. Descartes defines "thought" (*cogitatio*) as "what happens in me such that I am immediately conscious of it, insofar as I am conscious of it". Thinking is thus every activity of a person of which the person is immediately conscious.^[92] He gave reasons for thinking that waking thoughts are distinguishable from dreams, and that one's mind cannot have been "hijacked" by an evil demon placing an illusory external world before one's senses.^[89]

And so something that I thought I was seeing with my eyes is grasped solely by the faculty of judgment which is in my mind.^{[93]:109}

In this manner, Descartes proceeds to construct a system of knowledge, discarding perception as unreliable and, instead, admitting only deduction as a method.^[94]

Mind–body dualism

Descartes, influenced by the automatons on display at the Château de Saint-Germain-en-Laye near Paris, investigated the connection between mind and body, and how they interact.^[95] His main influences for dualism were theology and physics.^[96] The theory on the dualism of mind and body is Descartes' signature doctrine and permeates other theories he advanced. Known as Cartesian dualism (or mind–body dualism), his theory on the separation between the mind and the body went on to influence subsequent Western philosophies.^[97] In *Meditations on First Philosophy*, Descartes attempted to demonstrate the existence of God and the distinction between the human soul and the body. Humans are a union of mind and body;^[98] thus Descartes' dualism embraced the idea that mind and body are distinct but closely joined. While many contemporary readers of Descartes found the distinction between mind and body difficult to grasp, he thought it was entirely straightforward. Descartes employed the concept of *modes*, which are the ways in which substances exist. In *Principles of Philosophy*, Descartes explained, "we can clearly perceive a substance apart from the mode which we say differs from it, whereas we cannot, conversely, understand the mode apart from the substance". To perceive a mode apart from its substance requires an intellectual abstraction,^[99] which Descartes explained as follows:



L'homme (1664)

The intellectual abstraction consists in my turning my thought away from one part of the contents of this richer idea the better to apply it to the other part with greater attention. Thus, when I consider a shape without thinking of the substance or the extension whose shape it is, I make a mental abstraction.^[99]

According to Descartes, two substances are really distinct when each of them can exist apart from the other. Thus, Descartes reasoned that God is distinct from humans, and the body and mind of a human are also distinct from one another.^[100] He argued that the great differences between body (an extended thing) and mind (an un-extended, immaterial thing) make the two ontologically distinct. According to Descartes' indivisibility argument, the mind is utterly indivisible: because "when I consider the mind, or myself in so far as I am merely a thinking thing, I am unable to distinguish any part within myself; I understand myself to be something quite single and complete."^[101]

Moreover, in *The Meditations*, Descartes discusses a piece of wax and exposes the single most characteristic doctrine of Cartesian dualism: that the universe contained two radically different kinds of substances—the mind or soul defined as thinking, and the body defined as matter and unthinking.^[102] The Aristotelian philosophy of Descartes' days held that the universe was inherently purposeful or teleological. Everything that happened, be it the motion of the stars or the growth of a tree, was supposedly explainable by a certain purpose, goal or end that worked its way out within nature. Aristotle called this the "final cause", and these final causes were indispensable for explaining the ways nature operated. Descartes' theory of dualism supports the distinction between traditional Aristotelian science and the new science of Kepler and Galileo, which denied the role of a divine power and "final causes" in its attempts to explain nature. Descartes' dualism provided the philosophical rationale for the latter by expelling the final cause from the physical universe (or *res extensa*) in favor of the mind (or *res cogitans*). Therefore, while Cartesian dualism paved the way for modern physics, it also held the door open for religious beliefs about the immortality of the soul.^[103]

Descartes' dualism of mind and matter implied a concept of human beings. A human was, according to Descartes, a composite entity of mind and body. Descartes gave priority to the mind and argued that the mind could exist without the body, but the body could not exist without the mind. In *The Meditations*, Descartes even argues that while the mind is a substance, the body is composed only of "accidents".^[104] But he did argue that mind and body are closely joined:^[105]

Nature also teaches me, by the sensations of pain, hunger, thirst and so on, that I am not merely present in my body as a pilot in his ship, but that I am very closely joined and, as it were, intermingled with it, so that I and the body form a unit. If this were not so, I, who am nothing but a thinking thing, would not feel pain when the body was hurt, but would perceive the damage purely by the intellect, just as a sailor perceives by sight if anything in his ship is broken.^[105]

Descartes' discussion on embodiment raised one of the most perplexing problems of his dualism philosophy: What exactly is the relationship of union between the mind and the body of a person?^[105] Therefore, Cartesian dualism set the agenda for philosophical discussion of the mind-body problem for many years after Descartes' death.^[106] Descartes was also a rationalist and believed in the power of innate ideas.^[107] Descartes argued the theory of innate knowledge and that all humans were born with

knowledge through the higher power of God. It was this theory of innate knowledge that was later combated by philosopher John Locke (1632–1704), an empiricist.^[108] Empiricism holds that all knowledge is acquired through experience.

Physiology and psychology

In *The Passions of the Soul*, published in 1649,^[109] Descartes discussed the common contemporary belief that the human body contained animal spirits. These animal spirits were believed to be light and roaming fluids circulating rapidly around the nervous system between the brain and the muscles. These animal spirits were believed to affect the human soul, or passions of the soul. Descartes distinguished six basic passions: wonder, love, hatred, desire, joy and sadness. All of these passions, he argued, represented different combinations of the original spirit, and influenced the soul to will or want certain actions. He argued, for example, that fear is a passion that moves the soul to generate a response in the body. In line with his dualist teachings on the separation between the soul and the body, he hypothesized that some part of the brain served as a connector between the soul and the body and singled out the pineal gland as connector.^[110] Descartes argued that signals passed from the ear and the eye to the pineal gland, through animal spirits. Thus different motions in the gland cause various animal spirits. He argued that these motions in the pineal gland are based on God's will and that humans are supposed to want and like things that are useful to them. But he also argued that the animal spirits that moved around the body could distort the commands from the pineal gland, thus humans had to learn how to control their passions.^[111]

Descartes advanced a theory on automatic bodily reactions to external events, which influenced 19th-century reflex theory. He argued that external motions, such as touch and sound, reach the endings of the nerves and affect the animal spirits. For example, heat from fire affects a spot on the skin and sets in motion a chain of reactions, with the animal spirits reaching the brain through the central nervous system, and in turn, animal spirits are sent back to the muscles to move the hand away from the fire.^[111] Through this chain of reactions, the automatic reactions of the body do not require a thought process.^[107]

Above all, he was among the first scientists who believed that the soul should be subject to scientific investigation. He challenged the views of his contemporaries that the soul was divine, thus religious authorities regarded his books as dangerous.^[112] Descartes' writings went on to form the basis for theories on emotions and how cognitive evaluations were translated into affective processes. Descartes believed the brain resembled a working machine and that mathematics, and mechanics could explain complicated processes in it.^[113] In the 20th century, Alan Turing advanced computer science based on mathematical biology as inspired by Descartes. His theories on reflexes also served as the foundation for advanced physiological theories, more than 200 years after his death. The physiologist Ivan Pavlov was a great admirer of Descartes.^[114]

On animals

Descartes denied that animals had reason or intelligence.^[115] He argued that animals did not lack sensations or perceptions, but these could be explained mechanistically.^[116] Whereas humans had a soul, or mind, and were able to feel pain and anxiety, animals by virtue of not having a soul could not feel pain or anxiety. If animals showed signs of distress then this was to protect the body from damage, but the innate state needed for them to suffer was absent.^[117] Although Descartes's views were not universally accepted, they became prominent in Europe and North America, allowing humans to treat animals with impunity. The view that animals were quite separate from humanity and merely machines allowed for the

maltreatment of animals, and was sanctioned in law and societal norms until the middle of the 19th century.^{[118]:180–214} The publications of Charles Darwin would eventually erode the Cartesian view of animals.^{[119]:37} Darwin argued that the continuity between humans and other species suggested the possibility of animal suffering.^{[120]:177}

Moral philosophy

For Descartes, ethics was a science, the highest and most perfect of them. Like the rest of the sciences, ethics had its roots in metaphysics.^[94] In this way, he argues for the existence of God, investigates the place of man in nature, formulates the theory of mind–body dualism, and defends free will. However, as he was a convinced rationalist, Descartes clearly states that reason is sufficient in the search for the goods that individuals should seek, and virtue consists in the correct reasoning that should guide their actions. Nevertheless, the quality of this reasoning depends on knowledge and mental condition. For this reason, he said that a complete moral philosophy should include the study of the body.^{[121]:189} He discussed this subject in the correspondence with Princess Elisabeth of Bohemia, and as a result wrote his work *The Passions of the Soul*, that contains a study of the psychosomatic processes and reactions in man, with an emphasis on emotions or passions.^[122] His works about human passion and emotion would be the basis for the philosophy of his followers (see Cartesianism), and would have a lasting impact on ideas concerning what literature and art should be, specifically how it should invoke emotion.^[123]

Descartes and Zeno both identified sovereign goods with virtue. For Epicurus, the sovereign good was pleasure, and Descartes says that, in fact, this is not in contradiction with Zeno's teaching, because virtue produces a spiritual pleasure that is better than bodily pleasure. Regarding Aristotle's opinion that happiness (eudaimonia) depends on both moral virtue and also on the goods of fortune such as a moderate degree of wealth, Descartes does not deny that fortunes contributes to happiness, but remarks that they are in great proportion outside one's own control, whereas one's mind is under one's complete control.^[122] The moral writings of Descartes came at the last part of his life, but earlier, in his *Discourse on the Method*, he adopted three maxims to be able to act while he put all his ideas into doubt. Those maxims are known as his "Provisional Morals".

Religion

In the third and fifth *Meditation*, Descartes offers proofs of a benevolent God (the trademark argument and the ontological argument respectively). Descartes has faith in the account of reality his senses provide him, since he believed that God provided him with a working mind and sensory system and does not desire to deceive him. From this supposition, however, Descartes finally establishes the possibility of acquiring knowledge about the world based on deduction and perception. Regarding epistemology, therefore, Descartes can be said to have contributed such ideas as a conception of foundationalism and the possibility that reason is the only reliable method of attaining knowledge. Descartes, however, was very much aware that experimentation was necessary to verify and validate theories.^[94]

Descartes invokes his causal adequacy principle^[124] to support his trademark argument for the existence of God, quoting Lucretius in defence: "*Ex nihilo nihil fit*", meaning "Nothing comes from nothing" (Lucretius).^[125] *Oxford Reference* summarises the argument, as follows, "that our idea of perfection is related to its perfect origin (God), just as a stamp or trademark is left in an article of workmanship by its maker."^[126] In the fifth Meditation, Descartes presents a version of the ontological argument which is

founded on the possibility of thinking the "idea of a being that is supremely perfect and infinite," and suggests that "of all the ideas that are in me, the idea that I have of God is the most true, the most clear and distinct."^[127]

Descartes considered himself to be a devout Catholic,^{[81][82][83]} and one of the purposes of the *Meditations* was to defend the Catholic faith. His attempt to ground theological beliefs on reason encountered intense opposition in his time. Pascal regarded Descartes' views as a rationalist and mechanist, and accused him of deism: "I cannot forgive Descartes; in all his philosophy, Descartes did his best to dispense with God. But Descartes could not avoid prodding God to set the world in motion with a snap of his lordly fingers; after that, he had no more use for God," while a powerful contemporary, Martin Schoock, accused him of atheist beliefs, though Descartes had provided an explicit critique of atheism in his *Meditations*. The Catholic Church prohibited his books in 1663.^{[128][129][130]:274}

Descartes also wrote a response to external world skepticism. Through this method of skepticism, he does not doubt for the sake of doubting but to achieve concrete and reliable information. In other words, certainty. He argues that sensory perceptions come to him involuntarily, and are not willed by him. They are external to his senses, and according to Descartes, this is evidence of the existence of something outside of his mind, and thus, an external world. Descartes goes on to argue that the things in the external world are material by arguing that God would not deceive him as to the ideas that are being transmitted, and that God has given him the "propensity" to believe that such ideas are caused by material things. Descartes also believes a substance is something that does not need any assistance to function or exist. Descartes further explains how only God can be a true "substance". But minds are substances, meaning they need only God for it to function. The mind is a thinking substance. The means for a thinking substance stem from ideas.^[131]

Descartes steered clear of theological questions, restricting his attention to showing that there is no incompatibility between his metaphysics and theological orthodoxy. He avoided trying to demonstrate theological dogmas metaphysically. When challenged that he had not established the immortality of the soul merely in showing that the soul and the body are distinct substances, he replied, "I do not take it upon myself to try to use the power of human reason to settle any of those matters which depend on the free will of God."^[132]

Mathematics

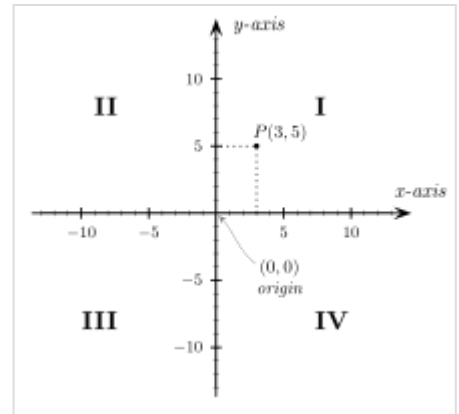
x for unknown; exponential notation

Descartes "invented the convention of representing unknowns in equations by x , y , and z , and knowns by a , b , and c ". He also "pioneered the standard notation" that uses superscripts to show the powers or exponents; for example, the 2 used in x^2 to indicate x squared.^{[133][134]:19}

Analytic geometry

One of Descartes' most enduring legacies was his development of Cartesian or analytic geometry, which uses algebra to describe geometry; the Cartesian coordinate system is named after him. He was first to assign a fundamental place for algebra in the system of knowledge, using it as a method to automate or mechanize reasoning, particularly about abstract, unknown quantities.^{[135]:91–114} European

mathematicians had previously viewed geometry as a more fundamental form of mathematics, serving as the foundation of algebra. Algebraic rules were given geometric proofs by mathematicians such as Pacioli, Cardano, Tartaglia and Ferrari. Equations of degree higher than the third were regarded as unreal, because a three-dimensional form, such as a cube, occupied the largest dimension of reality. Descartes professed that the abstract quantity a^2 could represent length as well as an area. This was in opposition to the teachings of mathematicians such as François Viète, who insisted that a second power must represent an area. Although Descartes did not pursue the subject, he preceded Gottfried Wilhelm Leibniz in envisioning a more general science of algebra or "universal mathematics", as a precursor to symbolic logic, that could encompass logical principles and methods symbolically, and mechanize general reasoning.^{[136]:280–281}



A Cartesian coordinates graph, using his invented x and y axes

Influence on Newton's mathematics

Current popular opinion holds that Descartes had the most influence of anyone on the young Isaac Newton, and this is arguably one of his most important contributions. Descartes' influence extended not directly from his original French edition of *La Géométrie*, however, but rather from Frans van Schooten's expanded second Latin edition of the work.^{[137]:100} Newton continued Descartes' work on cubic equations, which freed the subject from fetters of the Greek perspectives. The most important concept was his very modern treatment of single variables.^{[138]:109–129}

The basis of calculus

Descartes' work provided the basis for the calculus developed by Leibniz and Newton, who applied the infinitesimal calculus to the tangent line problem, thus permitting the evolution of that branch of modern mathematics.^[139] His rule of signs is also a commonly used method to determine the number of positive and negative roots of a polynomial.

Physics

Philosophy, metaphysics, and physics

Descartes is often regarded as the first thinker to emphasize the use of reason to develop the natural sciences.^[140] For him, philosophy was a thinking system that embodied all knowledge, as he related in a letter to a French translator:^[94]

Thus, all Philosophy is like a tree, of which Metaphysics is the root, Physics the trunk, and all the other sciences the branches that grow out of this trunk, which are reduced to three principals, namely, Medicine, Mechanics, and Ethics. By the science of Morals, I understand the highest and most perfect which, presupposing an entire knowledge of the other sciences, is the last degree of wisdom.

Mechanics

Mechanical philosophy

The beginning to Descartes' interest in physics is accredited to the amateur scientist and mathematician Isaac Beeckman, whom he met in 1618, and who was at the forefront of a new school of thought known as mechanical philosophy. With this foundation of reasoning, Descartes formulated many of his theories on mechanical and geometric physics.^[141] It is said that they met when both were looking at a placard that was set up in the Breda marketplace, detailing a mathematical problem to be solved. Descartes asked Beeckman to translate the problem from Dutch to French.^[142] In their following meetings Beeckman interested Descartes in his corpuscularian approach to mechanical theory, and convinced him to devote his studies to a mathematical approach to nature.^{[143][142]} In 1628, Beeckman also introduced him to many of Galileo's ideas.^[143] Together, they worked on free fall, catenaries, conic sections, and fluid statics. Both believed that it was necessary to create a method that thoroughly linked mathematics and physics.^[42]

Anticipating the concept of work

Although the concept of work (in physics) was not formally used until 1826, similar concepts existed before then.^[144] In 1637, Descartes wrote:^[145]

Lifting 100 lb one foot twice over is the same as lifting 200 lb one foot, or 100 lb two feet.

Conservation of motion

In *Principles of Philosophy* (*Principia Philosophiae*) from 1644 Descartes outlined his views on the universe. In it he describes his three laws of motion.^[146] (Newton's own laws of motion would later be modeled on Descartes' exposition.)^[141] Descartes defined "quantity of motion" (*Latin: quantitas motus*) as the product of size and speed,^[147] and claimed that the total quantity of motion in the universe is conserved.^[147]

If x is twice the size of y, and is moving half as fast, then there's the same amount of motion in each.

[God] created matter, along with its motion ... merely by letting things run their course, he preserves the same amount of motion ... as he put there in the beginning.

Descartes had discovered an early form of the law of conservation of momentum.^[148] He envisioned quantity of motion as pertaining to motion in a straight line, as opposed to perfect circular motion, as Galileo had envisioned it.^{[141][148]} Descartes' discovery should not be seen as the modern law of conservation of momentum, since it had no concept of mass as distinct from weight or size, and since he believed that it is speed rather than velocity that is conserved.^{[149][150][151]}

Planetary motion

Descartes' vortex theory of planetary motion was later rejected by Newton in favor of his law of universal gravitation, and most of the second book of Newton's *Principia* is devoted to his counterargument.

Optics

Descartes also made contributions to the field of optics. He showed by using geometric construction and the law of refraction (also known as Descartes' law, or more commonly Snell's law outside France) that the angular radius of a rainbow is 42 degrees (i.e., the angle subtended at the eye by the edge of the rainbow and the ray passing from the sun through the rainbow's centre is 42°).^[152] He also independently discovered the law of reflection, and his essay on optics was the first published mention of this law.^[153]

Meteorology

Within *Discourse on the Method*, there is an appendix in which Descartes discusses his theories on Meteorology known as *Les Météores*. He first proposed the idea that the elements were made up of small particles that join together imperfectly, thus leaving small spaces in between. These spaces were then filled with smaller much quicker "subtile matter".^[154] These particles were different based on what element they constructed, for example, Descartes believed that particles of water were "like little eels, which, though they join and twist around each other, do not, for all that, ever knot or hook together in such a way that they cannot easily be separated."^[154] In contrast, the particles that made up the more solid material, were constructed in a way that generated irregular shapes. The size of the particle also matters; if the particle was smaller, not only was it faster and constantly moving, it was more easily agitated by the larger particles, which were slow but had more force. The different qualities, such as combinations and shapes, gave rise to different secondary qualities of materials, such as temperature.^[155] This first idea is the basis for the rest of Descartes' theory on Meteorology.

While rejecting most of Aristotle's theories on Meteorology, he still kept some of the terminology that Aristotle used such as vapors and exhalations. These "vapors" would be drawn into the sky by the sun from "terrestrial substances" and would generate wind.^[154] Descartes also theorized that falling clouds would displace the air below them, also generating wind. Falling clouds could also generate thunder. He theorized that when a cloud rests above another cloud and the air around the top cloud is hot, it condenses the vapor around the top cloud, and causes the particles to fall. When the particles falling from the top cloud collided with the bottom cloud's particles it would create thunder.^[155] He compared his theory on thunder to his theory on avalanches. Descartes believed that the booming sound that avalanches created, was due to snow that was heated, and therefore heavier, falling onto the snow that was below it.^[155] This theory was supported by experience "It follows that one can understand why it thunders more rarely in winter than in summer; for then not enough heat reaches the highest clouds, in order to break them up."^[155]

Another theory that Descartes had was on the production of lightning. Descartes believed that lightning was caused by exhalations trapped between the two colliding clouds. He believed that in order to make these exhalations viable to produce lightning, they had to be made "fine and inflammable" by hot and dry weather.^[155] Whenever the clouds would collide, it would cause them to ignite, creating lightning; if the cloud above was heavier than the bottom cloud, it would also produce thunder.

Descartes also believed that clouds were made up of drops of water and ice, and believed that rain would fall whenever the air could no longer support them. It would fall as snow if the air was not warm enough to melt the raindrops. And hail was when the cloud drops would melt, and then freeze again because cold air would refreeze them.^{[154][155]}

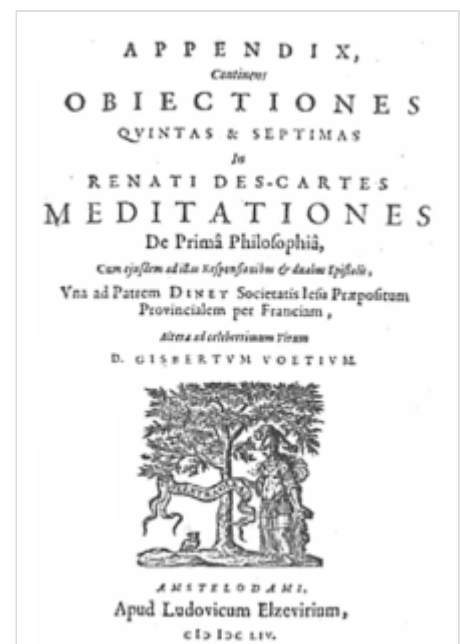
Descartes did not use mathematics or instruments (as there were not any at the time) to back up his theories on Meteorology and instead used qualitative reasoning in order to deduce his hypothesis.^[154]

Historical impact

Emancipation from Church doctrine

Descartes has often been dubbed the father of modern Western philosophy, the thinker whose approaches has profoundly changed the course of Western philosophy and set the basis for modernity.^{[19][156]} The first two of his *Meditations on First Philosophy*, those that formulate the famous methodic doubt, represent the portion of Descartes' writings that most influenced modern thinking.^[157] It has been argued that Descartes himself did not realize the extent of this revolutionary move.^[158] In shifting the debate from "what is true" to "of what can I be certain?", Descartes arguably shifted the authoritative guarantor of truth from God to humanity (even though Descartes himself claimed he received his visions from God)—while the traditional concept of "truth" implies an external authority, "certainty" instead relies on the judgment of the individual.

In an anthropocentric revolution, the human being is now raised to the level of a subject, an agent, an emancipated being equipped with autonomous reason. This was a revolutionary step that established the basis of modernity, the repercussions of which are still being felt: the emancipation of humanity from Christian revelational truth and Church doctrine; humanity making its own law and taking its own stand.^{[159][160][161]} In modernity, the guarantor of truth is not God anymore but human beings, each of whom is a "self-conscious shaper and guarantor" of their own reality.^{[162][163]} In that way, each person is turned into a reasoning adult, a subject and agent,^[162] as opposed to a child obedient to God. This change in perspective was characteristic of the shift from the Christian medieval period to the modern period, a shift that had been anticipated in other fields, and which was now being formulated in the field of philosophy by Descartes.^{[162][164]}



Cover of *Meditations*

This anthropocentric perspective of Descartes' work, establishing human reason as autonomous, provided the basis for the Enlightenment's emancipation from God and the Church. According to Martin Heidegger, the perspective of Descartes' work also provided the basis for all subsequent anthropology.^[165] Descartes' philosophical revolution is sometimes said to have sparked modern anthropocentrism and subjectivism.^{[19][166][167][168]}

Contemporary reception

In commercial terms, *The Discourse* appeared during Descartes' lifetime in a single edition of 500 copies, 200 of which were set aside for the author. Sharing a similar fate was the only French edition of *The Meditations*, which had not managed to sell out by the time of Descartes' death. A concomitant Latin edition of the latter was, however, eagerly sought out by Europe's scholarly community and proved a commercial success for Descartes.^{[169]:xliii–xliv}

Although Descartes was well known in academic circles towards the end of his life, the teaching of his works in schools was controversial. Henri de Roy (Henricus Regius, 1598–1679), Professor of Medicine at the University of Utrecht, was condemned by the Rector of the university, Gijsbert Voet (Voetius), for teaching Descartes' physics.^[170]

According to philosophy professor John Cottingham, Descartes's *Meditations on First Philosophy* is considered to be "one of the key texts of Western philosophy". Cottingham said that the *Meditations* is the "most widely studied of all Descartes' writings".^{[171]:50}

According to Anthony Gottlieb, a former senior editor of *The Economist*, and the author of *The Dream of Reason* and *The Dream of Enlightenment*, one of the reasons Descartes and Thomas Hobbes continue to be debated in the second decade of the twenty-first century, is that they still have something to say to us that remains relevant on questions such as, "What does the advance of science entail for our understanding of ourselves and our ideas of God?" and "How is government to deal with religious diversity."^[172]

In her 2018 interview with Tyler Cowen, Agnes Callard described Descartes' thought experiment in the *Meditations*, where he encouraged a complete, systematic doubting of everything that you believe, to "see what you come to". She said, "What Descartes comes to is a kind of real truth that he can build upon inside of his own mind."^[173] She said that Hamlet's monologues—"meditations on the nature of life and emotion"—were similar to Descartes' thought experiment. Hamlet/Descartes were "apart from the world", as if they were "trapped" in their own heads.^[173] Cowen asked Callard if Descartes actually found any truths through his thought experiment or was it just "an earlier version of the contemporary argument that we're living in a simulation, where the evil demon is the simulation rather than Bayesian reasoning?" Callard agreed that this argument can be traced to Descartes, who had said that he had refuted it. She clarified that in Descartes' reasoning, you do "end up back in the mind of God"—in a "universe God has created" that is the "real world"...The whole question is about being connected to reality as opposed to being a figment. If you're living in the world God created, God can create real things. So you're living in a real world."^[173]

Purported Rosicrucianism

The membership of Descartes to the Rosicrucians is debated.^[174]

The initials of his name have been linked to the R.C. acronym widely used by Rosicrucians.^[175] Furthermore, in 1619 Descartes moved to Ulm which was a well renowned international center of the Rosicrucian movement.^[175] During his journey in Germany, he met Johannes Faulhaber who had previously expressed his personal commitment to join the brotherhood.^[176]

Descartes dedicated the work titled *The Mathematical Treasure Trove of Polybius, Citizen of the World* to "learned men throughout the world and especially to the distinguished B.R.C. (Brothers of the Rosy Cross) in Germany". The work was not completed and its publication is uncertain.^[177]

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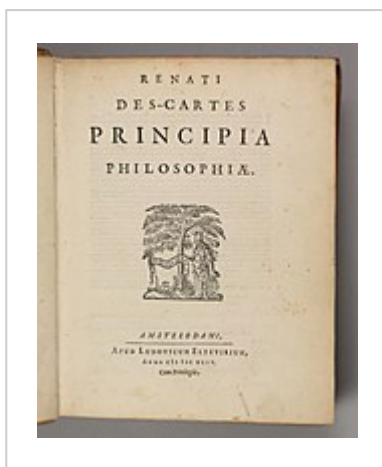
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In January 2010, a previously unknown letter from Descartes, dated 27 May 1641, was found by the Dutch philosopher Erik-Jan Bos when browsing through Google. Bos found the letter mentioned in a summary of autographs kept by Haverford College in Haverford, Pennsylvania. The college was unaware that the letter had never been published. This was the third letter by Descartes found in the last 25 years. ^{[181][182]}



Handwritten letter by
Descartes, December 1638



Principia philosophiae,
1644

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See also



- [3587 Descartes, asteroid](#)
- [Bucket argument](#)
- [Cartesian circle](#)
- [Cartesian materialism](#) (not a view that was held by or formulated by Descartes)
- [Cartesian plane](#)
- [Cartesian product](#)
- [Cartesian product of graphs](#)
- [Cartesian theater](#)
- [Cartesian tree](#)
- [Descartes \(crater\)](#) and [Highlands](#) on the Moon ([Apollo 16](#) landing site)
- [Descartes number](#)
- [Descartes Prize](#)
- [Descartes' rule of signs](#)
- [Descartes-Huygens Prize](#)
- [Descartes' theorem](#) (4 tangent circles)
- [Descartes' theorem on total angular defect](#)
- [Folium of Descartes](#)
- [List of things named after René Descartes](#)
- [Paris Descartes University](#)

Notes

1. Étienne Gilson argued in *La Liberté chez Descartes et la Théologie* (Alcan, 1913, pp. 132–147) that Duns Scotus was not the source of Descartes' [Voluntarism](#). Although there exist doctrinal differences between Descartes and Scotus "it is still possible to view Descartes as borrowing from a Scotist Voluntarist tradition".^[8]
2. Although the uncertain authorship of this most iconic portrait of Descartes was traditionally attributed to Frans Hals, there is no record of their meeting. During the 20th century the assumption was widely challenged.^[10]
3. Adjectival form: *Cartesian* /kɑːrˈtiːziən, -ˈtiːzən/
4. This idea had already been proposed by Spanish philosopher Gómez Pereira a hundred years ago in the form: "I know that I know something, anyone who knows exists, then I exist" (*nosco me aliquid noscere, & quidquid noscit, est, ergo ego sum*).
 - Pereira, Gómez. 1749 [1554]. "De Immortalitate Animae." *Antoniana Margarita*. p. 277.
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5. See also: [Epistemological turn](#).
6. While in the Netherlands he changed his address frequently, living among other places in Dordrecht (1628), [Franeker](#) (1629), Amsterdam (1629–1630), [Leiden](#) (1630), Amsterdam (1630–1632), [Deventer](#) (1632–1634), Amsterdam (1634–1635), [Utrecht](#) (1635–1636), [Leiden](#) (1636), [Egmond](#) (1636–1638), [Santpoort](#) (1638–1640), [Leiden](#) (1640–1641), [Endegeest](#) (a castle near Oegstgeest) (1641–1643), and finally for an extended time in [Egmond-Binnen](#) (1643–1649).

7. He had lived with Henricus Renieri in Deventer and Amsterdam, and had met with Constantijn Huygens and Vopiscus Fortunatus Plempius; Descartes was interviewed by Frans Burman at Egmond-Binnen in 1648. Henricus Regius, Jan Stampioen, Frans van Schooten, Comenius and Gisbertus Voetius were his main opponents.
8. The remains however are not in the tomb in the present day.

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156. Heidegger [1938] (2002), p. 76 "Descartes... that which he himself founded... modern (and that means, at the same time, Western) metaphysics."
157. Schmaltz, Tad M. *Radical Cartesianism: The French Reception of Descartes* (<https://books.google.com/books?id=plYcUBCOngC&pg=PA27>) Archived (<https://web.archive.org/web/20210816214240/https://books.google.com/books?id=plYcUBCOngC&pg=PA27>) 16 August 2021 at the [Wayback Machine](#) p. 27 quotation:

The Descartes most familiar to twentieth-century philosophers is the Descartes of the first two *Meditations*, someone preoccupied with hyperbolic doubt of the material world and the certainty of knowledge of the self that emerges from the famous cogito argument.

158. Roy Wood Sellars (1949) *Philosophy for the future: the quest of modern materialism* (<https://archive.org/details/philosophyforfut00sell>) "Husserl has taken Descartes very seriously in a historical as well as in a systematic sense [...] [in *The Crisis of the European Sciences and Transcendental Phenomenology*, Husserl] finds in the first two Meditations of Descartes a depth which it is difficult to fathom, and which Descartes himself was so little able to appreciate that he let go "the great discovery" he had in his hands."

159. Martin Heidegger [1938] (2002) *The Age of the World Picture* quotation:

For up to Descartes...a particular *sub-iectum*...lies at the foundation of its own fixed qualities and changing circumstances. The superiority of a *sub-iectum*...arises out of the claim of man to a...self-supported, unshakeable foundation of truth, in the sense of certainty. Why and how does this claim acquire its decisive authority? The claim originates in that emancipation of man in which he frees himself from obligation to Christian revelational truth and Church doctrine to a legislating for himself that takes its stand upon itself.

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161. Norman K. Swazo (2002) *Crisis theory and world order: Heideggerian reflections* (https://books.google.com/books?id=INP_cy6Mu7EC&pg=PA97) Archived (https://web.archive.org/web/20210816214249/https://books.google.com/books?id=INP_cy6Mu7EC&pg=PA97) 16 August 2021 at the Wayback Machine pp. 97–99
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163. Briton, Derek *The modern practice of adult education: a postmodern critique* (<https://archive.org/details/modernpracticeof0000brit/page/76>) p. 76
164. Martin Heidegger *The Word of Nietzsche: God is Dead* pp. 88–90
165. Heidegger [1938] (2002), p. 75 quotation:

With the interpretation of man as *subiectum*, Descartes creates the metaphysical presupposition for future anthropology of every kind and tendency.

166. Schwartz, B. I., *China and Other Matters* (Cambridge, MA: Harvard University Press, 1996), p. 95 (<https://books.google.com/books?id=Wt4XDLEpjWYC&pg=PA95>) Archived (<https://web.archive.org/web/20210816214238/https://books.google.com/books?id=Wt4XDLEpjWYC&pg=PA95>) 16 August 2021 at the Wayback Machine, quotation:

... the kind of anthropocentric subjectivism which has emerged from the Cartesian revolution.

167. Charles B. Guignon *Heidegger and the problem of knowledge* (<https://books.google.com/books?id=5vFCfdWD5QEC&pg=PA23>) Archived (<https://web.archive.org/web/20210816214243/https://books.google.com/books?id=5vFCfdWD5QEC&pg=PA23>) 16 August 2021 at the Wayback Machine p. 23

168. Husserl, Edmund (1931) *Cartesian Meditations: An Introduction to Phenomenology* quotation:

When, with the beginning of modern times, religious belief was becoming more and more externalized as a lifeless convention, men of intellect were lifted by a new belief: their great belief in an autonomous philosophy and science. [...] in philosophy, the *Meditations* were epoch-making in a quite unique sense, and precisely because of their going back to the pure *ego cogito*. Descartes work has been used, in fact to inaugurate an entirely new kind of philosophy. Changing its total style, philosophy takes a radical turn: from naïve objectivism to transcendental subjectivism.

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- Works by René Descartes (<https://www.gutenberg.org/ebooks/author/44>) at Project Gutenberg
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