

Huygens: The Man behind the Principle

Huygens: The Man behind the Principle is the story of the great seventeenth-century Dutch mathematician and physicist, Christiaan Huygens (1629–1695). As his first complete biography ever written in English, this book describes in detail how Huygens arrived at discoveries and inventions that are often wrongly ascribed to his younger contemporary Newton. At the same time it paints a vivid picture of Huygens' youth and adulthood, and the many fruits of his science.

Huygens played a key role in the 'scientific revolution' and the 'Huygens Principle' on the wave theory of light helped establish his reputation. The discovery of Saturn's rings and the invention of the pendulum clock made him so famous that he was invited to be the first director of the French Academy of Science, but his busy life as director teetered on the edge of powerlessness.

Despite Huygens' many achievements no complete biography has previously been published in English, a consequence of his Dutch origins and the fact that many important aspects of his life were only ever documented in Dutch. This book gives scientists and historians the opportunity to learn more about all aspects of Huygens' life and work while bringing his story to a wider audience.

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Huygens

The Man behind the Principle

C. D. ANDRIESSE

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Preface

This book describes the life of a great seventeenth-century Dutch mathematician and physicist, in a similar class to Newton. Although his reputation is well established and the Huygens Principle has been a source of enlightenment up until today, the man behind the light has remained in the dark. His Dutch origins, and the difficulties of the Dutch language, in which important facts of his life are documented, may be the reason why no complete biography has yet been published.

Strange as it may seem, this book is the first endeavour to bring to light all aspects of Huygens' life while he was developing his talents. Johan Vollgraff may have had it in mind when he listed the thousand-and-one facts on Huygens' life, which he came across as editor of the *Oeuvres*. He added them to the last volume of the *Oeuvres*, now some fifty years ago, but never wrote that first biography.

Arthur Bell made another attempt, as did Usher Frankfort together with Aleksandr Frenk, and Alfonsina D'Elia. However, all four were confined to the translations and selections of the *Oeuvres*, since they neither had knowledge of the Dutch language nor access to family documents. For this reason, the books they published in 1947, 1976 and 1985, respectively, cannot be seen as complete, or even reliable biographies. Bell regarded his own attempt as only a beginning, and long cherished the hope to write a large work on this 'great subject'.

Here then is my own endeavour. It is not a large work, and it is written for a wide public, with whom I wished to share my fascination for Huygens, but without encumbering this same public with detailed sources. *Titan kan niet slapen* – the original title of the

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book – was well received, despite its meagre documentation, and a French translation was quickly published. Yes, Huygens did spend some time in Paris!

The present edition, now in the *lingua franca* that is read all over the world, gives me the opportunity to add the references to my sources. To complete the book still further, I have extended the bibliography with the literature on Huygens that I did not, or was not able to consult initially. Although there is little that is able to throw new light on the man himself, two recent studies prompted me to add further information on Huygens' dioptrics and on his relations with Spinoza. The most substantial addition, however, is the overview with which it begins, the text that I read in Leiden to commemorate Huygens on the 300th anniversary of his death.

My endeavour to write this biography has taken me far from home. As a physicist I had been accustomed to writing papers with a modest number of pages containing clear and logical arguments. But for this book I had to become an historian, and to ponder over the significance of a multitude of lengthy documents that were often obscure and difficult to understand. I would not have got far without the help of scholars.

Therefore I would like to thank Sible de Blaauw, Hendrik Bos, Floris Cohen, Casper Hakfoort and Joella Yoder for their suggestions and comments on an early draft. When the book had appeared Hendrik Casimir, Jan Deiman, Cees Grimbergen, Elisabeth Keesing, Jan Nienhuys and Tim Trachet kindly pointed out some mistakes that I was able to correct in a second Dutch edition. Ad Leerintveld guided me through the world of Huygens' father's poetry, and Jan Nauta through the world of psychoanalysis. I also thank Robert van Gent and Rienk Vermij, who gave me permission to use their extensive Huygens bibliography in the present edition.

Finally I am most grateful to Hans van Himbergen, the dean who requested this English translation for the English-speaking guests of our Faculty, and who provided the means to realise it.

A commemoration¹

Christiaan Huygens died 300 years ago. Announcing his death, Gottfried Leibniz referred to his teacher and friend as *the Incomparable Huygens*.² We would like to use the same phrase today, but if Huygens is to be assured of an important place in history, we feel it is our duty to compare his achievements with those of other scientists. A contemporary colleague, grieving the loss of a close friend, might see that friend's achievements in a more favourable light than would posterity.

It is not difficult to compare him with Galileo Galilei. Huygens was strongly influenced by Galileo and took over many of his ideas. In his youth he had assimilated the ideas of Galileo's *Discorsi* and later in his life he developed many of Galileo's traits and characteristics. In fact, the resemblances were so numerous that when Huygens described Galileo he was almost painting a self-portrait. Shortly before he died Huygens wrote an essay about Cartesianism, in which he distanced himself from that philosophy. In this essay we read the following:³

Galileo had the acuteness of mind and knew all the mathematics necessary to proceed in science. One has to admit that he made beautiful discoveries about the nature of motion, although he left many aspects untouched. He was not so reckless and arrogant as to explain all natural causes, nor was he so vain that he wished to be the leader of a sect. He was modest and truthful. Yet he thought he had acquired eternal fame with his discoveries.

¹ Andriesse 3–13 ² OC 10, 721 ³ OC 10, 398 (404)

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It was as if Huygens were looking at himself in one of his own carefully polished and silver-plated mirrors.

This comparison with Galileo, although appropriate, is insufficient as an evaluation of Huygens' work and character. The scientific revolution of the seventeenth century involved many scientists, and therefore posterity is able to compare Huygens with many other actors. How, for instance, does he compare with the man who received practically all the honours? The answer to this tricky question is to be found in the background story of Huygens' greatest work.

The most important step on the way to this work, *Horologium oscillatorium*, was the proof that the weight of an isochronous pendulum follows a cycloid and that this path is the evolute of another cycloid. Above the proof Huygens wrote: '*Magna nec ingenijs investigata priorum*' ('This is something great that has not been investigated by geniuses of the past').⁴ In other words, he knew he was a genius – there is no doubt about that. He completed the proof on 15 December 1659, and took its motto from Ovid's *Metamorphoses*, which he had read when he was only twelve. Now, having reached the age of thirty, he felt he had made his greatest discovery. Only one week earlier he had told Frans van Schooten in a letter: this is 'certainly the finest thing I have ever come across'.⁵

He had indeed made a great discovery. He had found that the period of a pendulum would be independent of the swing, if the pendulum were deflected by platelets shaped like cycloids. But more important still than the actual finding was the way in which he had arrived at his conclusion. In fact, he had used the method of infinitesimal analysis. Later on, however, he was reluctant to accept formal calculus, for although he perfectly understood its roots, he found the rules obscure. Huygens was a master at summing indefinitely small line elements and an expert at using infinitesimal triangles.

⁴ OC 16, 406 ⁵ OC 2, 502

It was quite some time before Huygens' greatest work, *Horologium oscillatorium*, was published. This book about the pendulum clock was his tribute to the Academy of Science in Paris, or rather to the French king. By that time, 1673, Huygens had become the recognised leader of European science. Isaac Newton, who received a copy of the book via the secretary of the Royal Society in London, responded immediately. In a letter to the secretary, Newton commented that the book was very worthy of its author but that he had an easier proof of the isochronous property of the cycloid.⁶ 'If he (Huygens) please, I will send it him.'

In this simpler proof Newton used the calculus that he had invented eight years before, but had kept secret. Now he was willing to share his secret with the author of *Horologium oscillatorium*! What greater honour could Huygens receive? But Huygens declined the offer. He did not ask for the proof, probably because he was still offended. Only three months earlier Newton had wrecked their correspondence about light and colour by addressing Huygens like a delinquent schoolboy.⁷ Thereupon Huygens had put an end to the exchange of letters with the following polite but icy words:⁸ 'In view of the fact that he (Newton) upholds his doctrine with some fervour, I am not interested in continuing this dispute.'

This is drama. Collaboration between these men might have produced great things. Although they clearly did not like each other, each recognised the other's qualities. For instance, in Newton's letter about *Horologium oscillatorium* that ended with theses on centrifugal force, he urged Huygens to publish more about this force, since it 'may prove of good use in naturall Philosophy & Astronomy as well as mechanicks'.⁹

Since Newton himself had discovered the properties of centrifugal force in 1665 (five years after Huygens), he knew what he was talking about. *Horologium oscillatorium* made public what

⁶ OC 7, 325 ⁷ OC 7, 265 ⁸ OC 7, 302 ⁹ OC 7, 325

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Newton had thought was known only to himself. From that time onwards, therefore, any scientist could infer (and Newton had inferred it in the mean time) that the force that kept planets in orbit round the Sun must become weaker with the square of the distance to the Sun. In addition, any scientist could now generalise the proportionality between force and acceleration (the essence of Huygens' theses) to what is known today as Newton's second law. Huygens had, indeed, hit upon something that could be put to good use in both astronomy and mechanics.

Huygens was urged by Newton to publish more but chose not to do so, even though he had, in fact, written a complete treatise on centrifugal force. The treatise, *De vi centrifuga*, is dated 15 November 1659. This was precisely one month before he completed his proof of the isochrony of the cycloid. He was reluctant to publish his treatise on centrifugal force because he was not satisfied with it. However, after his death Burchard de Volder and Bernard Fullenius decided to publish the treatise, because they believed they were acting in accordance with Huygens' last will and testament. By that time, however, Newton's *Principia mathematica* had made its impact. We can say, therefore, that Huygens' treatise was published twenty years too late. In a sense publication also came 200 years too early. By then, Albert Einstein, not without acknowledging his debt to Huygens, was deducing the ultimate consequences of the relativity of motion.

Why did Huygens not wish to publish *De vi centrifuga*? The most likely reason is that it did not clarify what was relative in circular motion. This was a weak spot in the otherwise brilliant treatment of moving frames of reference, even when accelerated. When the time came for *Horologium oscillatorium* to be printed, he was confused about the relativity of circular motion and thought that it might in fact be absolute. Later on, three or four years before his death, he returned to the problem. Now he rejected the notion that circular motion could be absolute, thereby also rejecting

Newton's idea of absolute space, and attempted to solve the problem in words:¹⁰

Rotation is a relative motion of parts driven in different directions but kept together by a string or connection. But can one say that two bodies move relative to one another if their separation remains the same? This is perfectly possible, provided an increase in the separation is prevented. In fact, on the circumference (of a wheel) there is opposite relative motion.

Huygens believed in the complete relativity of motion, as firmly as he believed in the law of inertia, but he did not fully understand that these two concepts were in conflict with each other. 'Their inconsistency,' wrote Einstein,¹¹ 'was illuminated very clearly by Mach, but it had already been recognized with less clarity by Huygens and Leibniz.' This praise by Einstein may be excessive, but there is no doubt that Huygens was the first person to take relativity seriously. He wanted to study all its consequences, even if this meant withholding his treatise on centrifugal force, which could have been his greatest contribution to science. He chose a very fitting motto for *De vi centrifuga*. He took it from Horace's letters, which he had also read when he was only twelve years old: '*Libera per vacuum posui vestigia princeps*' ('I was the first to take free steps through emptiness').¹²

By lingering so long at the summit of Huygens' achievements, we are inclined to forget about the rest of the mountain beneath. There is much to be said about his other work, too. One thing we must certainly do is to dispel the myth that the remainder of his work is a loose pile of stones, a collection of casual findings. Another thing we must do is to discard the notion that it must be a monolith, representing one grand idea. Is it not time that we stopped regarding history as a dialectic of grand ideas? For grand ideas are always poorly

¹⁰ OC 16, 233 ¹¹ French 267–268 ¹² OC 16, 302

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defined, loose constructs that, on close examination, burst like soap bubbles. Huygens, for instance, began by accepting the breathtaking conjectures of René Descartes, but later in life he produced subtle arguments to shatter these conjectures. When Huygens worked with the ideas of others, he elaborated and renewed these ideas, and added important elements. To him, ideas were flexible tools with which he tried to get a grip on the world. His findings were far from casual.

Let us take a look at his early work on collisions that is contained in the unpublished treatise *De motu corporum ex percussione*, dated 1656. In this work he used not only Galileo's idea of relativity, but also an idea of Evangelista Torricelli, namely that the centre of gravity of many connected bodies lies as low as is physically possible. '*Nisi principium ponatur nihil demonstrari potest*' concluded Huygens ('Nothing can be proved unless this principle is laid down').¹³

Recognising the significance of this principle, he rephrased it several times. He first used the principle in 1646, when he tried to prove that the catenary is not a parabola.¹⁴ He rephrased it in 1650 for his extensive study of floating bodies¹⁵ and arrived at the brilliant generalisation of 1652, when he wrote his equations for the conservation of kinetic energy, the name given to them today.¹⁶ The philosopher may not realise that these algebraic equations are, in fact, a rephrasing of the principle, but the physicist is stunned by their boldness.

Why Van Schooten discouraged Huygens from publishing his treatise on collisions is a story in itself.¹⁷ Suffice it to say that publication would have dealt Cartesianism a blow. But the treatise played an important role in the development of Huygens' thinking. Let us take a look at his later work on light, namely his *Traité de la lumière* of 1677, published in 1690. Because he regarded light as a wave effect in ether, he had to return to collision theory. The Cartesian idea was that ether was a space filled randomly by myriads

¹³ OC 11, 37 ¹⁴ *Ibid.* ¹⁵ OC 11, 81 ¹⁶ OC 16, 98 ¹⁷ OC 1, 299

of invisibly small particles. Therefore the rectilinear propagation of light, as well as its reflection and refraction, could only be explained in terms of a summation of pulses caused by all kinds of collisions between these particles. Despite his mastery of mathematics Huygens could not find satisfactory solutions based on collision theory.¹⁸ Realising the kind of mathematics that was needed to explain the propagation of light, he silently abandoned the idea of colliding particles, and invented a new principle. This principle was yet another blow to Cartesianism. The principle proved to be correct and accurately described electromagnetic waves,¹⁹ waves that had still to be discovered.

To complete this survey of the mountain, we return to the persistent view that history is a dialectic of conflicting grand ideas. Once upon a time, Georg Hegel tried to prove that ideas were identical to realities. He used the curious argument that reality is 'mind-like' and therefore reasonable, just as any idea must be. Physicists find such a theory difficult to accept. To physicists (and to most thinking people) the ideas in our mind are different from realities or facts of nature. Ideas may conflict with one another, but facts cannot. Hegelianism, however, is still around today – in paradigms, methodologies and research programmes. Its continuing influence has not helped Huygens' reputation, and has lowered his status in the history of science.

Alexandre Koyré was the first to misjudge Huygens' work by putting it under Hegel's microscope. According to Koyré:²⁰ 'Huygens paid a tremendous price for his fidelity to Cartesian rationalism à *outrance*.' Richard Westfall²¹ used the same microscope and concluded that, if Huygens were to have pursued his ideas on dynamics, 'it is reasonable to speculate that textbooks today would refer to Huygens' two laws of motion instead of to Newton's three'. Eduard Dijksterhuis, who may have had as much affinity with physics as with history, took a broader view, but still saw an idea as

¹⁸ Shapiro 208 ¹⁹ De Lang 20 ²⁰ Koyré 116 ²¹ *Ibid.* 188

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dominating Huygens' work, namely the idea of the mechanisation of nature.²²

Will we ever get rid of the grand ideas? Can we not start to appreciate the subtle pragmatism of Huygens' work? Some day soon, Joella Yoder²³ will be ready to help us, by using this approach.

So far we have concentrated on Huygens, the genius. Now let us turn to Christiaan, the man. We have already seen how scrupulous and painstaking he was. This characteristic is a key to both the brilliance of his mind and anguish of his soul:²⁴

*Tristitia quodcumque agitat mens inficit aegri
 Nec tibi judiciis propriis tunc fidere fas est.*

The mind infects whatever it touches with a miserable sickness
 And at such a time it is not right to trust your own judgements.

He wrote these verses during his later years at Hofwijck. Immediately we step into another emptiness, and in a way we are the first to do so.

It has become customary to claim that Christiaan's character is difficult to fathom. It is as if he were impenetrable, like a statue. A century ago Johannes Bosscha, second editor of the *Oeuvres complètes* and secretary of Holland's association of sciences, addressed a meeting commemorating Huygens' death. He began his speech about Christiaan, saying:²⁵ 'Paying one's last respects to a friend is one of the greater griefs of life. In our eyes he is an image of noble seriousness, undisturbed by fleeting passion, an image of clarity, hardly touched by the commotion of life.' When a man has been praised to high heaven, one wonders whether he can ever be brought back to earth.

Let us try and bring Christiaan back. We will now compare some of his letters with texts about Christiaan written by his father,

²² Dijksterhuis (1950) 405–418; 503–509

²³ Yoder *passim* ²⁴ OC 10, 719 ²⁵ Bosscha 1

Constantijn, the redoubtable poet–diplomat. Father and son had very different characters; the son appears pale beside the father.

Christiaan was reserved, tending to stand aloof from social events and ceremonies. We see this attitude in the following episode. No sooner had Christiaan finished his great work of 1659 than he was expected to attend the wedding of his sister Suzanna. Whereas Constantijn describes the party with all its sounds, smells and colours²⁶ – mentioning the copious dinner, the kisses over the wine, the 1600 candles at the ball, the musicians, the near-uproar outside the bride’s room – Christiaan (in a letter²⁷) merely regrets how much time he wasted on the ‘compulsory’ merriment.

We know of only one letter by Christiaan that describes some kind of merriment. He wrote it when he was twenty-six; accompanied by three young men, he went on a grand tour through France – the country where he was later to be bathed in glory. Christiaan wrote to an acquaintance in the Hague:²⁸

I wish you had a flying horse . . . so that you could be with us, either on our trip when we sailed down the Loire, or on the occasions we performed a heroic deed, for instance, when we decided by the *lot del fortunato dado* who should sleep alone and who with another, or when we needed a new horse and had to choose out of four, the best of which was blind . . .

The trip down the Loire was to Angers, where Christiaan had to buy a doctorate in law by order of his father.

He wrote to his father on the matter:²⁹ ‘When we get back with the diploma I shall do my best to perceive the world as you understand it, and I think it will be possible to do that if you are kind enough to let me have the time.’ Christiaan was never able to free himself from the redoubtable Constantijn. It is significant that when his father died at the age of ninety, Christiaan had a portrait painted of himself in which he was depicted as an orphan³⁰ – an orphan aged fifty-eight.

²⁶ OC 3, 67 ²⁷ OC 3, 65 ²⁸ OC 1, 353 ²⁹ OC 1, 344 ³⁰ Vollgraff 754

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He shaped and moulded the text of his letters as if he were grinding a lens. The mastery of mathematics gave him access to the physical world, in the same way as the mastery of his passions gave him access to himself. He must have thought along these lines, as did the *virtuosi* of the Renaissance who served as an example to Constantijn. Even when angry, Christiaan was usually able to retain his composure. Nevertheless, he did write a number of angry letters; there is one about Eustachio Divini who attacked his ring hypothesis regarding Saturn,³¹ and there is another about Robert Hooke who contested Christiaan's claim to have invented the balance spring for a watch.³² His rage was boundless in a letter about François Catelan, who maintained that there was an error in *Horologium oscillatorium*. He wrote:³³

I am astonished at his attack on my theory for the centre of oscillation, which no one has remarked upon in the nine years since its publication. Now that I have examined his so-called refutation of my theory, I am surprised that the author has not withdrawn it in the seven months since its publication. For, to put it briefly: he finds that the sum of two line segments cannot be equal to the sum of two other line segments, if the ratios of these segments differ. Imagine that the first two are 4 and 8 feet long, and the other 3 and 9 feet, and then see how you can obtain a sum for either the one or the other that is anything other than 12 . . . It would please greatly me if this could be published, so that those not familiar with my proof [*Horologium oscillatorium*], do not think that the remarks of Catelan are of any significance. Should he still return to the subject, then you will oblige me by submitting his answer to a professional before having it published. Surely that is to the advantage of his honour. And if truth be told, I find it distasteful to be attacked by such a blockhead.

³¹ OC 3, 118 ³² OC 7, 528 ³³ OC 8, 349

Even when abusing others, Christiaan retains a degree of equilibrium. So did he ever lose his temper? What did he mean when he wrote about the sickening of the mind? In his works we do, indeed, find traces of disintegration and darkness. Not only his diaries and notes written on loose sheets, but also his polished letters reveal less pleasant sides to his character: cunning, lust for money, dirty tricks, fornication, self-pity, angry outbursts. He was extremely rude to Isaac Thuret, who dared to apply for a patent on the balance spring that Thuret had helped to develop.³⁴ He played a dirty trick on Nicolaas Hartsoeker by presenting Hartsoeker's microscope as his own.³⁵ He treated these men as inferiors, even as servants. His behaviour may have had its roots in his social upbringing.

He was not particularly courteous to Gilles de Roberval, either. Roberval was the only colleague in the Academy of Science in Paris who could act as his match, and the only one who stood up against Christiaan's pulse theory of gravity. In clear, strong terms he argued that the pulses in Christiaan's device for explaining gravity did not have to be directed towards a centre.³⁶ It is both reprehensible and offensive to counter such a penetrating argument by the simple statement 'that the reason I give for the particle to be pushed towards the centre is very clear, and cannot be disputed'.³⁷ This critique, aggravated by Roberval's objections to his way of calculating oscillation centres, prompted a crisis.

We will now say something about Christiaan's melancholy, this striking trait in his character. Should we compare his '*melancholia hypochondrica vera et mera*' with the spleen in the poetry of Charles Baudelaire? Perhaps, but there is an important difference; the various depressions that Christiaan experienced fit into a pattern. His depression of 1670, possibly the deepest, followed directly after the debate with Roberval. Francis Vernon, a secretary

³⁴ OC 7, 408–416 ³⁵ OC 8, 96–103 ³⁶ OC 19, 640 ³⁷ OC 19, 642

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at the English legation in Paris, has left us a moving description of his visit to Christiaan during this illness.³⁸

His weaknesse & palenesse did sufficiently declare how great a destruction his sicknesse had wrought in his health & vigour & that though all was bad, wch I saw, yet there was something worse wch the eye could not perceive nor sense discover, which was a great dejection in his vital spirits, an incredible want of sleep, wch neither hee, not those who counceled & assisted him in his sickness knew how to remedie.

He feared that he was 'neare to the very Point of Death' and complained that the Academy was 'mixt with tinctures of Envy', since it was completely dependent on the favour of a minister. As a result of his depression, Christiaan was unable to work for almost a year and had to return to Holland to recover.

We can easily guess what prompted his depressions in 1675, 1679 (around his fiftieth birthday) and 1681. They could have been brought on by the ineffectiveness of his patent on the balance spring, by the intrigues that followed the trick he played on Hartsoecker, and by the comet debate (which was won by Ole Rømer). He took to his bed, as if paralysed, and let himself be carried by a servant.³⁹ Members of the family who came to see him in Paris started to speak of his guilty conscience. His older brother noted that he seemed 'to be afraid of vicars'⁴⁰ and his sister provided him with a nurse, Beguine Lacour, but she was unable to help him.

Interestingly, his illnesses, at least those of 1691 and 1693, occurred not only in France, but also in Holland. Sometimes it is difficult to distinguish them from the colds accompanied by a splitting headache, from which he suffered all his life. The first headache is mentioned in a letter of 1652, in which the genius describes how this *capitis dolor* interferes with his studies.⁴¹

³⁸ OC 7, 9 ³⁹ OC 7, 35 ⁴⁰ OC 7, 27 ⁴¹ OC 1, 184

A biographer attempting to interpret this melancholy has to venture into barren land, or into emptiness. What is the cause of this debilitating force? It is certainly not mental exhaustion after a period of activity and creativity, as the events of his life make clear. What are the properties of this force? Christiaan does not write about his suffering. Or was he, in fact, doing so when he noted in the margin of a loose sheet that 'without satisfactory business, the mind yields to casual passions which often do harm to others'?⁴² If so, this again points to feelings of guilt. Not only this comment, but also other hints give the impression that his work had become a refuge from the indefinite '*tristitia*', a real abyss.

Perhaps we can attempt to understand Christiaan's melancholy by following in the footsteps of Sigmund Freud:⁴³

Melancholy is characterised by profound dejection, by the loss of interest in the outside world and the loss of one's self-respect, which is expressed in self-reproach and sometimes in the anticipation that one will be punished. We can understand this syndrome somewhat better if we bear in mind that the symptoms of mourning are almost identical, the only difference being that (in mourning) one's self-esteem is not impaired.

The next step in the Freudian approach is to identify what has been lost. Whereas mourning is the reaction to the loss of a loved one, melancholy, which impairs one's self-respect, may be a reaction to the loss of a dearly loved part of one's ego. Freud assumed that the ego is, or can be, split into several parts. But this lost part of the ego cannot be buried; it is as if it remains present in the person and can never be detached. The person in mourning, however, is detached from his or her loved one.

A major symptom of melancholy is insomnia. Insomnia testifies to a person's inability to abandon all occupations, to that abandonment which is necessary to fall asleep. We have ample

⁴² Vollgraff 493 ⁴³ Freud 74

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evidence of Christiaan's insomnia. There is another major symptom of melancholy. Following the loss of part of one's ego, the ego that remains will regard itself as worthless and reprehensible. The melancholic rails at himself and expects to be driven out and punished. According to Christiaan's sister-in-law, who often came to see him in the last few months of his life, Christiaan presented these symptoms, and displayed this kind of behaviour.⁴⁴

If there is some truth in this interpretation, let us now consider what part of his ego Christiaan may have lost. According to Freud's theory, it would have been the part he valued most. In Christiaan, two strands, two lives were in competition: the personal and the intellectual. Arthur Schopenhauer described such a dichotomy:⁴⁵

A privileged man (like a genius) leads, alongside his personal life, another life that is intellectual. It is this life that gradually becomes his only goal, and for which he comes to consider the other as merely a means towards achieving it. This intellectual life, especially, comes to preoccupy him; it acquires, through the continual growth of his insight and knowledge, a lasting coherence and intensity; it moves constantly forward towards a more self-contained perfection and fulfilment, like a work of art in genesis.

Was it, then, this life that Christiaan had lost? Was it his genius that he lost?

We can ask questions, but our answers can only be tentative because a man's soul defies analysis. If Christiaan's melancholy of 1670 was due to a 'loss of genius' as a result of being exposed to Roberval's profound intellectual critique, then he must have been preoccupied by the notion that either his ego must be intellectually superior to anyone else's or it must cease to exist. This attitude probably stemmed from his constant striving to perceive the world in the same way as his father did. Christiaan's melancholy, however,

⁴⁴ Huygens 25, 472–504 ⁴⁵ Schopenhauer 299 (§52)

was not just the result of a 'loss of genius', it was mingled with symptoms of true mourning.

As we have seen, in his deepest melancholy Christiaan asked to be carried around – like a child. This may have been connected with his early memories about his mother's death. He was only eight years old when his mother Suzanna lay on her deathbed, and he was the only child to be admitted to the sickroom.⁴⁶ He had to be lifted up so that he could see his mother. She kissed him goodbye, saying: 'Kom hier mijn soete mannetie, laet ick u eens kussen.'

Six months later the boy, unlike the other children in the family, was still wearing a 'long mourning skirt'.⁴⁷ Suzanna and Christiaan were said to resemble one another in that they were both of a calm and serious disposition. But several years before his mother's death, Christiaan would sometimes withdraw into himself.⁴⁸ However, he is also said to have been very obedient and helpful, though easily hurt. At a very early age he learned to take refuge in an inner world, the world of the intellect. As he grew older it became increasingly difficult for him to find any comfort in the world outside his intellectual world. Perhaps this can help us to understand the drama surrounding his death.

His older brother has left us a description.⁴⁹ Christiaan lay in a darkened room in a house in the Noordeinde, in The Hague. He was in pain, he started to cut himself with glass splinters, refused food because he thought it was poisoned, he shouted deliriously that 'people would tear him to pieces if they only knew what he thought about religion'. When he finally agreed that the vicar be summoned, it was because he felt he no longer had the strength to resist his family's wishes. But even in the presence of the vicar, he stuck to his views – although we do not know what these were. 'The Reverend Olivier addressed him for a long time,' wrote the brother, 'and prayed for him, but he is not willing to change his mind. Sadness all

⁴⁶ Eyffinger 107 (§75) ⁴⁷ *Ibid.* 107 (§78)

⁴⁸ *Ibid.* 106 (§68) ⁴⁹ Huygens 25, 472–504

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round.' During the night he loses consciousness. At half past three in the morning the family is informed.

When Christiaan Huygens disappeared into the emptiness on 8 July 1695, it is unlikely that his shocked family was able to grasp the fact that this scrupulous mind craved clarity right up until the very end.