CAPITOLO

4

Restoration: Fire, Plague and the New Science

"Let us then suppose the mind to be, as we say, white paper, void of all characters, without any ideas."
— John Locke, An Essay Concerning Human Understanding (1690), II.1.2

OBIETTIVI

1. I can explain how the Restoration, the Plague, the Great Fire and the Glorious Revolution changed England between 1660 and 1689, and why the Royal Society mattered.
2. I can describe Restoration comedy, Dryden's public poetry and Pepys's diary, using the terms comedy of manners, Poet Laureate and diary.
3. I can analyse an eyewitness diary, a scientific description and a public poem about the same years, and compare their purpose and style.
4. I can hedge and boost claims (*seem, tend to, may, it is likely that, suggest*) to write about evidence without over-claiming.
5. I can explain a process and its causes aloud and write a short abstract of a school experiment.

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On 29 May 1660, his thirtieth birthday, Charles II rode into London. Eleven years after his father's execution, England had a king again, and the theatres, the maypoles and the Christmas celebrations that the Puritans had banned came back with him. The next thirty years were some of the most dramatic in the history of the capital: in 1665 the plague killed tens of thousands of Londoners; in 1666 a fire that began in a baker's house burnt most of the old City; in 1688 a king was driven out without a battle in England, and Parliament wrote down the conditions on which his successors would rule.

The same years saw a quieter revolution. A group of gentlemen, doctors and mathematicians began to meet in London to do experiments, measure, weigh and look through lenses — and to report what they saw in a plain new kind of prose. In this chapter you read three very different witnesses of the age: a civil servant writing his secret diary on the morning of the Great Fire, a scientist describing the first "cells" ever seen, and the official poet who turned the fire into a public epic. In Language you learn how careful writers **hedge** their claims, and in Skills you explain processes and write the abstract of an experiment, as real scientists still do.

4.1 History and Society: Restoration and Revolution, 1660–1689

The timeline (Figura 4.1) shows the period at a glance. Above the axis are the books, the science and the theatre of the age; below it, the political events. Notice how crowded the 1660s are: in less than ten years London saw a new king, a new scientific society, a plague, a fire and a war at sea.

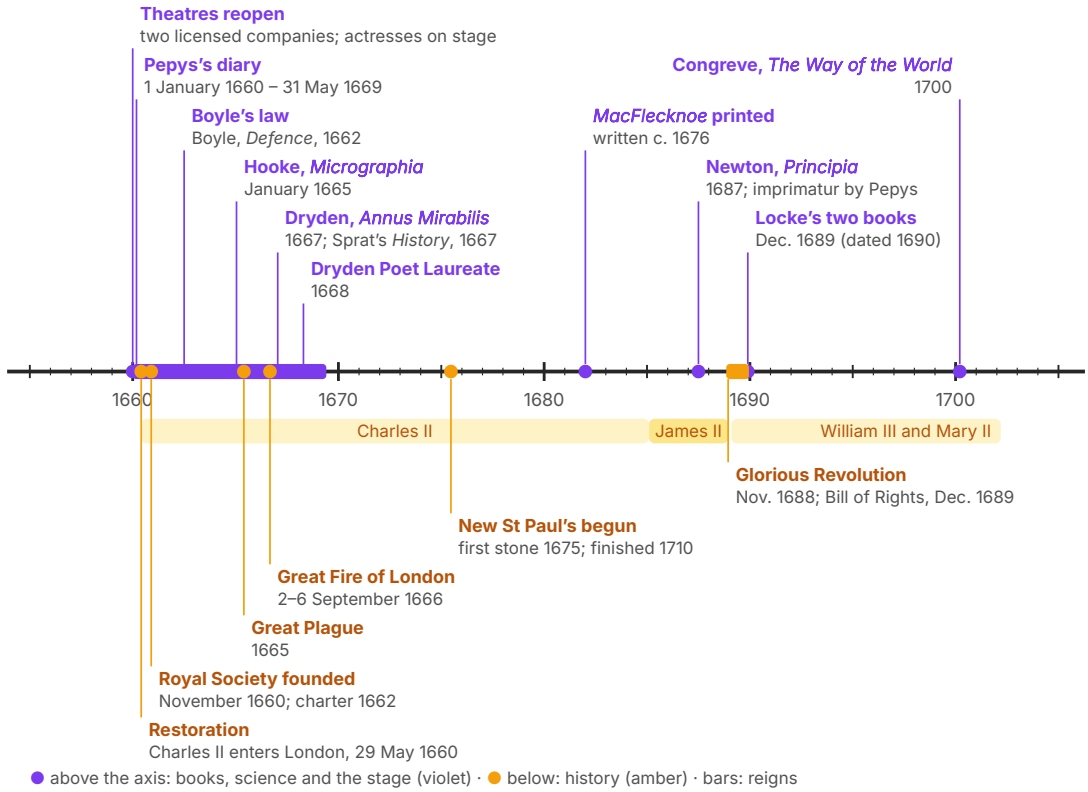


Figura 4.1 From the Restoration to 1705 on a proportional time axis (ticks every year, labels every ten years). Above the axis, books, science and the stage (violet); below it, political history (amber). Bars show events that last for some time; the coloured band under the years shows the reigns.

4.1.1 The king comes back

After Oliver Cromwell's death in 1658 the republic fell apart. In April 1660 Charles, who had lived in exile on the Continent, promised a general pardon and religious tolerance in the **Declaration of Breda**, and Parliament invited him home. The return of the monarchy is called the **Restoration** (*Restaurazione*); the word also names the whole period of Charles II's reign (1660–1685) and its culture.

The Restoration was not a simple return to the past. A few of the men who had signed Charles I's death warrant were executed, but most former enemies were pardoned. The king could no longer rule without Parliament, as his father had tried to do, and the Church of England became once again the official Church, while Puritans and other Protestant "dissenters" were pushed out of public life. Charles himself loved science, horse racing, the theatre and fashionable French culture, and his court set a new, freer tone in manners and morals. A newer fashion, the

coffee house (the first in London had opened in 1652), became the place where men read the news and argued about politics and science; you will visit one in chapter 5.

4.1.2 The Royal Society: "take nobody's word for it"

On 28 November 1660, after a lecture by the young astronomer Christopher Wren at Gresham College in London, twelve men decided to form a society "for the promoting of physico-mathematical experimental learning". Charles II gave it royal charters in 1662 and 1663, and it became the **Royal Society** of London for Improving Natural Knowledge — today one of the oldest scientific academies in the world still in existence. Its members, the *Fellows*, included the chemist Robert Boyle, the architect Wren, Robert Hooke (its paid Curator of Experiments from 1662) and, later, Isaac Newton.

The Society's motto, *Nullius in verba*, adapts a line by the Latin poet Horace and means "on the word of nobody": do not accept a statement because a famous authority, ancient or modern, made it; test it. Members repeated experiments in front of witnesses, recorded the results and published them in the *Philosophical Transactions* (from 1665), one of the first scientific journals. This trust in observation and experiment rather than in books and pure reasoning is called **empiricism** (*empirismo*), from the Greek word for experience. Not everybody was impressed: in February 1664 Samuel Pepys noted that the king "mightily laughed at" the Society "for spending time only in weighing of ayre". Weighing air, as you will see in the Connections section, was exactly the kind of experiment that founded modern physics.

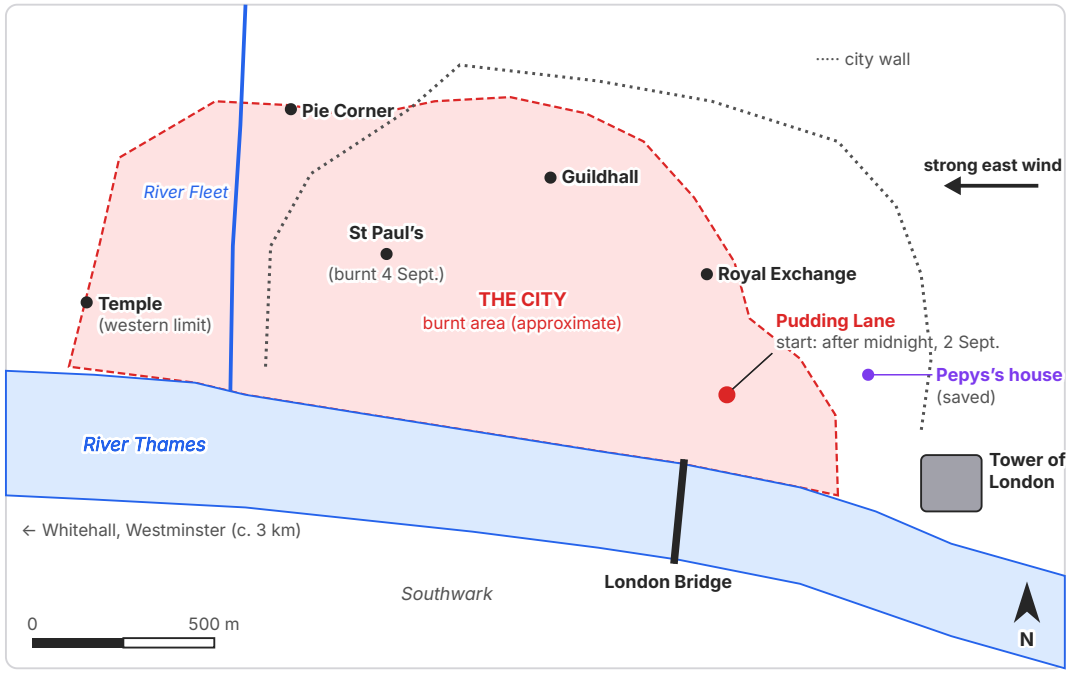
> **DA RICORDARE**
>
> **The Royal Society.** First meeting 28 November 1660 (Gresham College, London) · royal charters 1662 and 1663 · motto *Nullius in verba*, "take nobody's word for it" · journal *Philosophical Transactions* from 1665 · early Fellows: Boyle, Wren, Hooke, later Newton (President from 1703). The ideal: experiment, witnesses, plain reports.

4.1.3 Plague and Fire, 1665–1666

In 1665 London suffered its last great epidemic of bubonic plague. The *Bills of Mortality*, the weekly lists of burials published by the parishes, recorded about 68,600 deaths from plague in that year, and historians think that the real number was higher, perhaps around 100,000 — a large part of the population of a city of about 400,000–500,000 people. The court and the rich left for the country; the poor stayed. (Daniel Defoe's account of that year is one of the texts of chapter 6.)

A year later, in the early hours of Sunday 2 September 1666, a fire broke out in the house of Thomas Farriner, the king's baker, in Pudding Lane, near London Bridge. The summer had been long and dry, the houses were mostly of timber, the warehouses by the river were full of oil, tar and spirits, and a strong east wind was blowing. The fire spread west through the City

for four days (Figura 4.2). It destroyed about 13,200 houses, 87 parish churches, the Royal Exchange and the old Gothic cathedral of St Paul's. When the wind dropped on 5 September, and after whole streets of houses had been pulled down or blown up with gunpowder to create **fire-breaks** (*tagliafuoco*), gaps with nothing left to burn, the fire was finally brought under control. Only a handful of deaths were officially recorded, but nobody knows how many people really died: the poor were not always counted, and the heat may have left no remains.



Thames banks, wall and burnt area simplified from historical maps; positions approximate.

Figura 4.2 The City of London and the Great Fire of September 1666. The red area is the part that burnt (approximate); the dotted line is the old city wall. The fire started in Pudding Lane and was driven west by the wind, beyond the wall as far as Pie Corner and the Temple. Scale bar: 500 m.

ERRORE FREQUENTE

✗ «Nel Grande incendio morirono solo sei persone.» → ✓ Le morti *registrate* furono pochissime, ma il numero reale non si conosce: i poveri spesso non venivano contati e il calore può aver distrutto i resti. Si dice «il numero ufficiale è basso», non «morirono solo sei persone».

✗ «Locke scrisse che la mente è una *tabula rasa*.» → ✓ Locke scrisse *white paper*, «carta bianca». L'etichetta latina *tabula rasa* fu applicata alla sua idea più tardi.

✗ «La Gloriosa Rivoluzione fu pacifica ovunque.» → ✓ In Inghilterra il passaggio di potere avvenne quasi senza combattimenti, ma in Irlanda e in Scozia ci fu una guerra (battaglia del Boyne, 1690).

4.1.4 Rebuilding London

Within days of the fire, Wren and others presented the king with plans for a new City of wide, straight streets and open squares. None was adopted: every owner had a right to his land, and merchants needed to start trading again at once. The Rebuilding Act of 1667 required new houses to be built of brick or stone, with standard heights according to the width of the street, and a new tax on coal paid for the public buildings. Wren designed 51 new City churches and the new **St Paul's Cathedral**, built between 1675 and 1710, with the great dome that still dominates the skyline. Wren and Hooke also designed the **Monument** to the Great Fire (1671–1677), a column near the place where the fire began.

4.1.5 The Glorious Revolution and John Locke

Charles II had many children, but none with his wife, so in 1685 the crown passed to his brother, **James II**, an openly Catholic king. James appointed Catholics to the army and to official posts, ignoring laws that excluded them, and when his wife gave birth to a son in June 1688, many Protestants feared a permanent Catholic dynasty. A group of leading politicians invited the Dutch prince **William of Orange**, husband of James's Protestant daughter Mary, to intervene. William landed in Devon on 5 November 1688 with an army; James's support collapsed and he fled to France.

In February 1689 Parliament offered the crown to William III and Mary II together, and in December 1689 it passed the **Bill of Rights** (*Carta dei diritti*): the monarch could not suspend laws, raise taxes or keep an army in peacetime without the consent of Parliament; elections had to be free, and Members of Parliament could speak freely in debates. England had become a **constitutional monarchy** (*monarchia costituzionale*), in which the ruler's power is limited by law and by an elected assembly. The events of 1688–89 are called the **Glorious Revolution** (*Gloriosa Rivoluzione*) because in England power changed hands with very little fighting — though not in Ireland and Scotland, where there was war.

The philosopher who explained the new order was **John Locke** (1632–1704), a doctor and a Fellow of the Royal Society, who came back from exile in the Netherlands in 1689. In *Two Treatises of Government* (published in 1689, dated 1690) he argued that government exists to protect people's "lives, liberties and estates", that it rests on the consent of the governed, and that a people may resist a ruler who betrays that trust. In *An Essay Concerning Human Understanding* (December 1689, dated 1690) he asked where our ideas come from. His answer is the empiricist answer of the Royal Society: the mind at birth is, in his own image, "white paper", and everything written on it comes "from experience" — from the senses and from reflection on what the senses bring.

4.2 Literature: the Stage, the Laureate and the Diarist

4.2.1 The theatres reopen

The Puritan government had closed the theatres in 1642 (chapter 3). In 1660 Charles II gave two men, Thomas Killigrew and William Davenant, the right to form the only two licensed companies in London, the King's Company and the Duke's Company. The new playhouses were indoor theatres with painted, movable scenery, lit by candles, and their audience was smaller and more fashionable than the crowds of Shakespeare's Globe: courtiers, lawyers, rich merchants and their wives — and sometimes the king himself.

The great novelty was on the stage. Until 1642 women's parts had been played by boy actors (English 3, chapter 10). Now, following the French and Italian example, the royal patent of 1662 allowed women's parts to be performed by women, and **actresses** became stars. A woman playing Desdemona in *Othello* in December 1660 is often named as the first professional actress on the English stage; the best known, Nell Gwyn, was famous for her comic roles. Women also began to write for the theatre: **Aphra Behn** (1640–1689), whose comedy *The Rover* was staged in 1677, was one of the first Englishwomen to earn her living by writing.

4.2.2 The comedy of manners

The typical new genre was the **comedy of manners** (*commedia di costume*): a witty comedy set in fashionable London society, which laughs at the way people talk, dress, flirt, marry and pursue money and reputation. Its plots turn on love affairs, marriages arranged for money, jealous husbands and clever intrigues; its real pleasure is the dialogue, full of quick, elegant, often cynical repartee. The characters are types: the *wits*, who are intelligent and cool; the **fop** (*damerino*), a man so obsessed with fashion and appearance that he becomes ridiculous; the country squire, lost in town; the old man who wants a young wife.

William Wycherley's *The Country Wife* (1675) is one of the boldest of these comedies; the most admired is William Congreve's ***The Way of the World*** (1700), in which the lovers Mirabell and Millamant discuss the "provisos", the conditions of their marriage, like two equals negotia-

ting a contract. Some critics attacked the comedies as immoral, and towards 1700 the stage began to change; but the genre had a long life, and you will meet its heirs in the novels of Jane Austen (chapter 14).

4.2.3 John Dryden, the public poet

The leading writer of the age was **John Dryden** (1631–1700): poet, playwright, translator and critic. In 1668 he was appointed the first official **Poet Laureate** (*poeta laureato*), the poet paid by the Crown to write verse for national occasions; the title, from the laurel crown of the ancient poets, still exists today. As a Catholic who refused to swear loyalty to William and Mary, he lost the post in 1689.

Dryden wrote for a public that wanted to read about its own history. *Annus Mirabilis: The Year of Wonders, 1666* (published in January 1667) celebrates the naval war against the Dutch and London's survival of the Great Fire, in 304 four-line stanzas of iambic pentameter rhyming *abab*. He also perfected the **heroic couplet** (English 3, chapter 6) as a weapon of satire. In *MacFlecknoe* (written around 1676, printed in 1682) the old king of Nonsense chooses the playwright Thomas Shadwell as his heir, because "The rest to some faint meaning make pretence, / But Shadwell never deviates into sense." The balanced, epigrammatic couplet, perfect for argument and mockery, passed from Dryden to Alexander Pope (chapter 5).

4.2.4 Samuel Pepys and the diary

A **diary** (*diario*) is a private record written day by day, in which the writer notes events, thoughts and feelings soon after they happen, usually without planning to publish it. **Samuel Pepys** (1633–1703), the son of a tailor, became an efficient administrator of the Navy, a Member of Parliament and, from 1684 to 1686, President of the Royal Society: his name appears on the title page of Newton's *Principia* (1687) as the President who licensed it.

From 1 January 1660 to 31 May 1669, when he stopped because he feared he was going blind, Pepys kept a diary of more than a million words. He wrote it in **shorthand** (*stenografia*), a system of quick symbols for sounds and words — the one devised by Thomas Shelton — so that servants and family could not read it. The diary records the coronation, the plague and the fire, the theatre, music, business at the Navy Office, quarrels with his wife Elizabeth, his own vanities and infidelities, what he ate and what he paid. Its value is precisely this mixture: great public events seen through the eyes of a curious, honest and very human observer. On 21 January 1665 he sat up until two in the morning reading Hooke's new book on the microscope, "the most ingenious book that ever I read in my life".

APPROFONDIMENTO

Deciphering Pepys. Pepys left his library, including the six volumes of the diary, to Magdalene College, Cambridge, his old college, where it still is. In 1819–1822 a student, John Smith, transcribed the shorthand, apparently without knowing that a guide to Shelton's system was in the same library. A selection edited by Lord Braybrooke appeared in 1825, and the diary became a classic. Early editors left out the passages they thought indecent; Henry B. Wheatley's edition (1893–1899), from which T1 is taken, was much fuller, and the first complete text appeared only in the 1970s.

4.2.5 Plain style: how science changed English prose

The Royal Society also had views about language. In his *History of the Royal Society* (1667) Thomas Sprat explained that its members had decided to reject "all the amplifications, digressions, and swellings of style" and to demand from every Fellow "a close, naked, natural way of speaking", preferring the language of "artisans, countrymen, and merchants" to that of wits and scholars. This ideal of **plain style** (*stile piano*) — short, clear sentences, concrete words, few ornaments, facts before opinions — shaped scientific writing in English, and also the prose of journalists and, later, of novelists such as Defoe (chapter 6). Compare it with the elaborate metaphysical conceits of chapter 2: within a generation, the ideal of English prose had changed.

4.3 Texts: Fire, Cork and a Phoenix City

Three texts from the same three years, 1665–1667, written for three different readers: Pepys wrote only for himself, Hooke for the learned public of Europe, Dryden for the nation. As you read, ask each time: who is speaking, to whom, and why?

4.3.1 T1 · Samuel Pepys, *Diary*, 2 September 1666

Context. Pepys lived in Seething Lane, near the Tower of London, about 400 metres east of Pudding Lane. It is Sunday ("the Lord's day"), and he and his wife are expecting guests for dinner; Jane is their maid. Later that morning Pepys went by boat to Whitehall and, by his own account, told the king that only pulling houses down could stop the fire. The text keeps the spelling of the edition ("nightgowne", "balconys").

Tabella 4.1 T1 — Pepys, *Diary*, 2 September 1666 (extracts). Text of H. B. Wheatley's edition (1893–1899) as given in Project Gutenberg eBook #4200, checked against the transcription of the same edition at pepysdiary.com; original spelling; […] marks a cut.

2nd (Lord's day). […] Jane called us up about three in the morning, to tell us of a great fire they saw in the City. So I rose and slipped on my nightgowne, and went to her window, and thought it to be on the backside of Marke-lane at the farthest; but, being unused to such fires as followed, I thought it far enough off; and so went to bed again and to sleep. […]
By and by Jane comes and tells me that she hears that above 300 houses have been burned down to-night by the fire we saw, and that it is now burning down all Fish-street, by London Bridge. So I made myself ready presently, and walked to the Tower, and there got up upon one of the high places, Sir J. Robinson's little son going up with me; and there I did see the houses at that end of the bridge all on fire, and an infinite great fire on this and the other side the end of the bridge […]. So down, with my heart full of trouble, to the Lieutenant of the Tower, who tells me that it begun this morning in the King's baker's house in Pudding-lane, and that it hath burned St. Magnus's Church and most part of Fish-street already. […]
And among other things, the poor pigeons, I perceive, were loth to leave their houses, but hovered about the windows and balconys till they were, some of them burned, their wings, and fell down.

Glosses. *nightgowne*: here a dressing gown · *the backside of Marke-lane*: the back of Mark Lane, a street near his house · *far enough off*: far enough away to be safe · *to-night*: during the night just passed · *presently*: at once (today it means "soon" or "now") · *the Tower*: the Tower of London · *it begun*: it began (an older past form) · *hath*: has · *loth*: unwilling (today *loath*) · *balconys*: balconies.

Analysis

Form. A diary entry, written within a day or two of the events, in the first person and mostly in chronological order: night, then the morning, then the walk to the Tower. Tenses move freely between past and present (*Jane comes and tells me… So I made myself ready*), as in spoken storytelling, and long sentences are joined by *and* and *so*: Pepys is writing quickly, for himself, not composing for readers.

Language. Notice the precise, almost scientific details — the time, the number of houses, the exact streets, the place where the fire began — next to strong personal words: *an infinite great fire*, *with my heart full of trouble*. The "I" is always present (*I rose… I thought… I did see… I perceive*), and the emphatic *did see* stresses that this is eyewitness evidence.

Themes. The entry begins with a mistake: Pepys sees the fire, judges it "far enough off" and goes back to bed. While he sleeps, the disaster grows: by the morning, "above 300 houses" have burnt. The last sentence moves from the city to a tiny detail, the pigeons that will not leave their nests and fall with burnt wings; it shows how much Pepys observed, and it says more about the horror of the fire than any general statement could.

1. How did Pepys first hear about the fire, and what did he decide? Why?

2. Which pieces of information does he receive from other people, and which does he see for himself?
3. Find three exact facts (numbers, places, names) and two phrases that express feelings.
4. What is the effect of the final sentence about the pigeons?
5. Pepys never meant the diary to be read. How can you tell from the style?

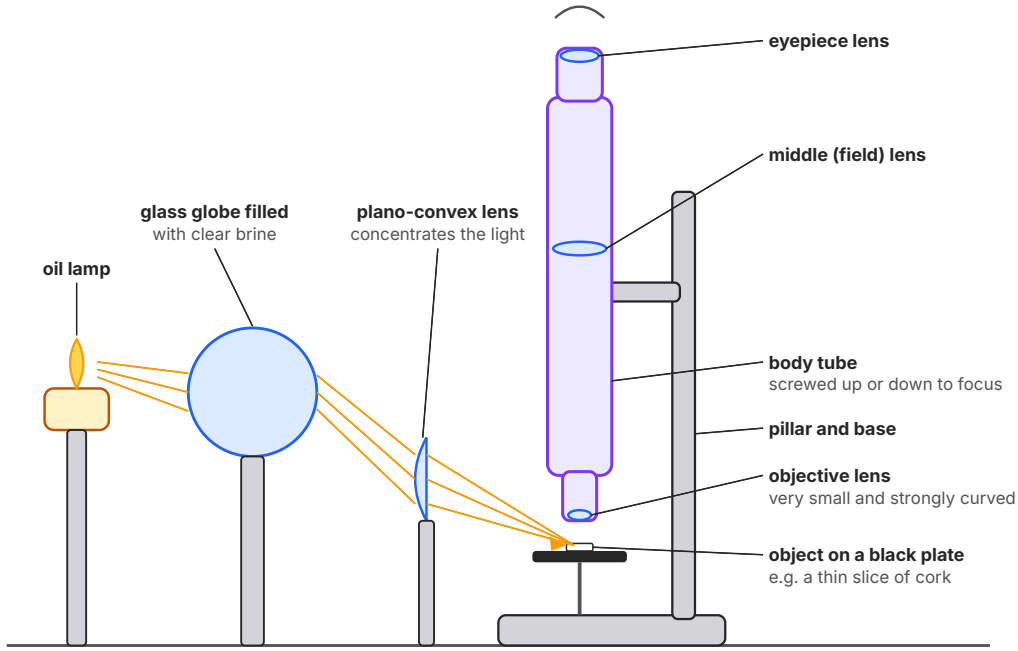
ESEMPIO SVOLTO

Reading a diary entry as historical evidence: T1 in four steps.

1. **Who, when, where?** Pepys, a Navy official, writing at home near the Tower about 2 September 1666, very soon after the events.
2. **What did he witness directly?** The fire seen from Jane's window at about 3 a.m.; the burning houses at the end of London Bridge, seen from a high point of the Tower; the pigeons.
3. **What did he only hear?** The 300 houses (from Jane, who "hears" it); the start in Pudding Lane (from the Lieutenant of the Tower). Report these as information he received: *According to the Lieutenant, the fire had started…*
4. **How reliable is it?** Very valuable: an eyewitness with no reason to lie in a private book. But it is one man's view, limited to what he saw and heard; historians compare it with other sources, such as letters and official papers.

4.3.2 T2 · Robert Hooke, *Micrographia* (1665), Observation XVIII

Context. *Micrographia*, "small drawing", published by Robert Hooke (1635–1703) in January 1665 with the approval of the Royal Society, describes 60 observations made with a **compound microscope** (*microscopio composto*), an instrument with two or more lenses, one magnifying the image made by the other (Figura 4.3). Its large engraved plates of a flea, a louse and the eye of a fly amazed readers. In Observation XVIII Hooke first looks at a piece of cork without seeing clearly; in the extract he tries again with a better method.



Light path (amber): lamp → globe of brine → lens → object → objective → eye. Not to scale.

Figura 4.3 Robert Hooke's compound microscope and his lighting system, simplified, after the Preface to *Micrographia*. The light of a small oil lamp passes through a glass globe filled with brine and a plano-convex lens, which together concentrate it on the object; the image made by the objective lens is magnified by the eyepiece.

Tabella 4.2 T2 — Hooke, *Micrographia*, Observation XVIII, "Of the Schematisme or Texture of Cork…" (extracts). Original spelling of the first edition (London, 1665), from Project Gutenberg eBook #15491; the italics of the original are not reproduced; […] marks a cut.

[…] I with the same sharp Penknife, cut off from the former smooth surface an exceeding thin piece of it, and placing it on a black object Plate, because it was it self a white body, and casting the light on it with a deep plano convex Glass, I could exceeding plainly perceive it to be all perforated and porous, much like a Honey-comb, but that the pores of it were not regular […].
Next, in that these pores, or cells, were not very deep, but consisted of a great many little Boxes, separated out of one continued long pore, by certain Diaphragms […].
I no sooner discern'd these (which were indeed the first microscopical pores I ever saw, and perhaps, that were ever seen, for I had not met with any Writer or Person, that had made any mention of them before this) but me thought I had with the discovery of them, presently hinted to me the true and intelligible reason of all the Phænomena of Cork […].

Glosses. *it self*: itself · *object Plate*: the small plate on which the object is placed · *plano convex Glass*: a lens flat on one side and curved outwards on the other · *but that*: except that · *Diaphragms*: thin walls dividing a tube · *discern'd*: saw clearly, distinguished · *me thought*: it seemed to me (old impersonal verb; compare Dryden's *methinks* in T3) · *hinted to me*: suggested to me · *Phænomena*: observable facts (singular *phenomenon*).

Analysis

Form. A report of an experiment in the first person: the method (a thinner slice, a dark background, concentrated light), then the observation, then its meaning. This is the structure of a scientific paper in miniature, and the plain style Sprat recommended: concrete nouns (*Penknife, Plate, Glass, Boxes*) and a clear sequence of actions.

Language. To make the unknown visible, Hooke compares it with familiar things: the cork looks *much like a Honey-comb*, its pores are *little Boxes*, and he calls them *cells*, the small rooms of a monastery or a honeycomb. The word passed into biology. Notice also how carefully he measures his claims: *perhaps* they were the first ever seen, *for I had not met with* anyone who mentioned them — he claims only what he can support. Elsewhere in the same observation he writes "it seems very probable". These are hedges, the subject of the Language section.

Themes. The joy of discovery (*I no sooner discern'd these… but* the reasons of cork's lightness became clear) and the method of the new science: improve the instrument, look again, then explain. Hooke did not see living cells, and he did not know what they were: the walls he saw were the dead walls of plant cells. The idea that all living things are made of cells came almost two centuries later.

1. What three things did Hooke change to see the cork better?
2. What does he compare the cork to, and why is the comparison useful for his readers?
3. Find two expressions with which Hooke limits or qualifies his claim to be the first.
4. *I no sooner discern'd these… but…*: how would a modern writer say this? (Think of chapter 3.)
5. Which features of T2 would still be acceptable in a scientific report today, and which would not?

4.3.3 T3 · John Dryden, *Annus Mirabilis* (1667), stanzas 218 and 293

Context. In the last part of the poem Dryden describes the fire as a living enemy and the king as the father of the city. Stanza 218 shows the first hours of the fire; stanza 293, near the end, imagines the new London that will rise from the ashes, like the phoenix of legend. Dryden's own note explains that "the town which gives the Indies name" is Mexico, famous for its silver and gold.

Tabella 4.3 T3 — Dryden, *Annus Mirabilis*, stanzas 218 and 293 (stanza numbers in the right-hand column). Spelling modernised as in George Gilfillan's edition, *The Poetical Works of John Dryden* (1855), Project Gutenberg eBook #11488; stanza numbers checked against the edition of 1688.

Then in some close-pent room it crept along,	218
And, smouldering as it went, in silence fed;	
Till the infant monster, with devouring strong,	
Walk'd boldly upright with exalted head.	
Methinks already from this chemic flame,	293
I see a city of more precious mould:	
Rich as the town which gives the Indies name,	
With silver paved, and all divine with gold.	

Glosses. *close-pent*: closed, with no air · *smouldering*: burning slowly without flames · *devouring strong*: strong from eating everything · *exalted*: raised high · *methinks*: it seems to me · *chemic*: alchemical; alchemists tried to turn base metals into gold by fire · *mould*: material, substance; also the form in which metal is cast · *the Indies*: the Americas.

Analysis

Form. Each stanza is a quatrain of iambic pentameter rhyming *abab* (*along / fed / strong / head*; *flame / mould / name / gold*). Dryden said he chose this stanza because it was "more noble, and of greater dignity" than any other verse form in English: it slows the narrative down and gives every image a frame.

Language. Stanza 218 is an extended personification (English 3, chapter 11): the fire is a baby monster that *crept*, *fed* and then *walk'd boldly upright*, like a child growing up into a giant. Stanza 293 turns destruction into creation with an alchemical metaphor: the fire is a *chemic flame* that will transform the old city into gold. The *m*, *s* and *p* sounds (*smouldering… silence; precious… paved*) slow the lines down.

Themes. This is public, political poetry. Pepys sees chaos and helplessness; Dryden, writing as a loyal supporter of the king, turns the disaster into a sign of national rebirth. It is optimism with a purpose: to give Londoners — and investors — confidence in their city and its government.

1. List the verbs that describe the fire in stanza 218. How do they show it growing?
2. Explain the alchemy metaphor of *this chemic flame* in your own words.
3. Scan the line *Methinks already from this chemic flame*: mark the stressed syllables.
4. Compare the tone of T3 with the tone of T1. Which text do you trust more as evidence, and which tells you more about the age?

ERRORE FREQUENTE

✗ «Hooke scoprì le cellule viventi.» → ✓ Hooke vide e chiamò *cells* le pareti di cellule vegetali morte del sughero; la teoria cellulare (tutti gli esseri viventi sono fatti di cellule) è dell'Ottocento.

✗ «Pepys scrisse il diario per pubblicarlo.» → ✓ Lo scrisse in stenografia, per sé; fu decifrato e pubblicato solo nel 1825.

✗ «*Annus Mirabilis* significa "anno disastroso".» → ✓ *Mirabilis* = «meraviglioso, straordinario»: Dryden presenta il 1666 come un anno di prodigi, in cui Londra è stata messa alla prova ma salvata.

4.4 Language: Hedging and Stance

4.4.1 Why careful writers hedge

Compare two sentences about the Great Fire: *The fire killed only six people* and *The official death toll was very low, but the real number is likely to have been higher*. The first states a "fact" that the evidence does not support; the second says exactly how sure we can be. A **hedge** (*attenuatore*, from the word for a protective row of bushes) is a word or structure that makes a claim more cautious; a **booster** (*rafforzativo*) makes it stronger. Together they express the writer's **stance** (*posizione*): how certain he or she is, and how far he or she agrees. Academic and scientific writing in English hedges constantly — not because writers are unsure of everything, but because they claim exactly what the evidence shows and no more. It is the Royal Society's *Nullius in verba* turned into grammar. The scale in Figura 4.4 shows the main expressions in order of certainty.

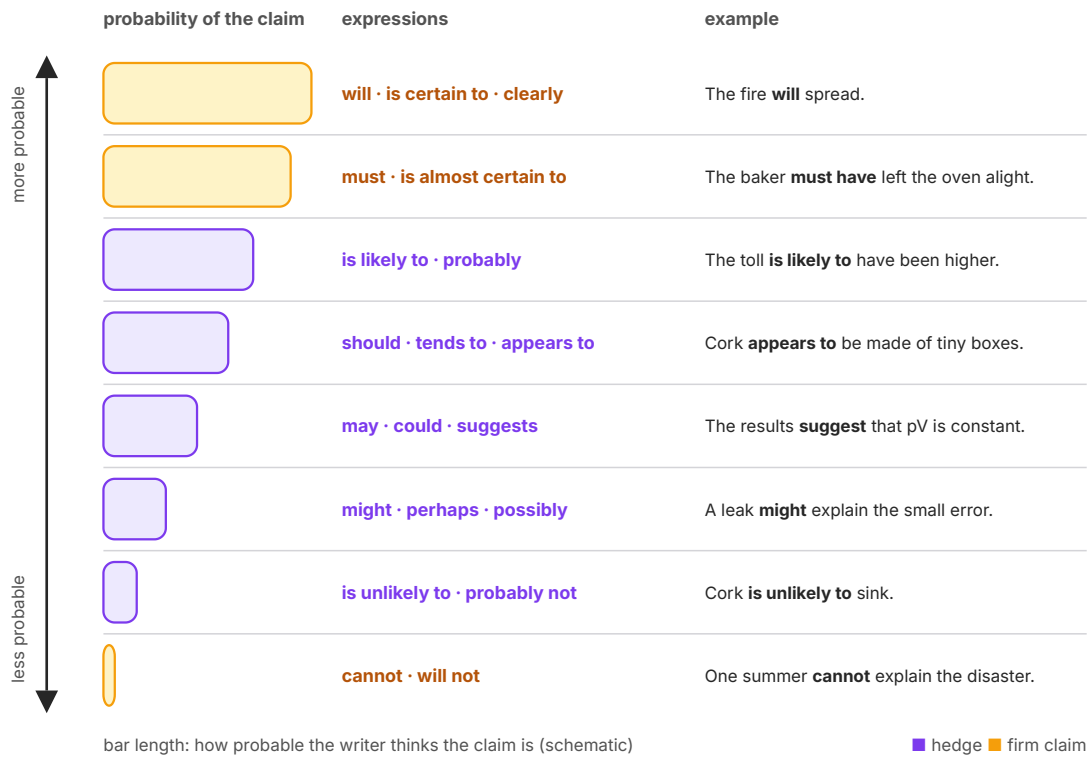


Figura 4.4 A scale of probability: firm claims and boosters (amber) at the two ends, hedges (violet) in between, with examples from this chapter. The positions are schematic: the same expression can be stronger or weaker in context.

4.4.2 Verbs and modals: *seem, appear, tend to, may, suggest*

Tabella 4.4 Hedging with verbs and modals

Structure	Example
seem / appear + *to*-infinitive	Cork **appears to** be full of air. · The diary **seems to have been** written within hours.
it seems / appears that + clause	**It appears that** the fire began in the bakehouse.
tend to + infinitive (a general tendency)	Eyewitnesses **tend to** exaggerate numbers.
may / might / could + infinitive (possibility)	The heat **may have destroyed** the remains. · This **could** explain the error.
suggest / indicate + *that* (what evidence shows)	These figures **suggest that** the plague killed one Londoner in five.
would + verb of opinion (softening)	**I would argue that** Dryden is writing propaganda.

Notice two things. First, *seem / appear* + **perfect infinitive** (*to have done*) refers to the past: *Pepys seems to have underestimated the fire* = it seems that he underestimated it. Second, *suggest* and *indicate* have evidence as subject (*the results, the data, the diary*), not people: the writer lets the facts speak.

GRAMMAR IN ITALIANO

Verbi e modali per attenuare (*hedging*). *seem / appear to* + infinito = «sembrare»: *The diary seems to be reliable* → «il diario sembra (essere) attendibile». Con il passato si usa l'**infinito perfetto**: *He seems to have left* = «sembra che sia partito». *tend to* = «tendere a, di solito»: *Diarists tend to write quickly*. *may / might / could* + *have* + participio = possibilità nel passato: *The baker may have forgotten the oven* = «il fornaio potrebbe aver dimenticato il forno».

Confronto con l'italiano. L'italiano attenua spesso con il **condizionale** («il fuoco sarebbe partito da un forno») o con il congiuntivo dopo «sembra che». L'inglese NON usa il condizionale per questo: ✗ *The fire would have started in a bakery* → ✓ *The fire is thought to have started / seems to have started in a bakery*.

4.4.3 Adjectives, adverbs and impersonal structures

Tabella 4.5 Hedging with adjectives, adverbs and impersonal structures

Structure	Example
it is likely / possible / probable that + clause	**It is likely that** the fire killed more people than the records show.
subject + **be likely / unlikely to** + infinitive	The real number **is likely to** have been higher. · Cork **is unlikely to** sink.
probably / possibly / perhaps	The diary is **probably** accurate. · **Perhaps** Hooke was the first.
arguably / apparently / approximately	Pepys is **arguably** the best witness. · **Approximately** 13,200 houses burnt.
it is thought / believed / said that + clause; subject + **is thought to** (English 3, chapter 4)	**It has been suggested that** the wind was the main cause. · Farriner **is thought to have** put out his oven.
there is evidence that / **to some extent** / **in most cases**	**There is some evidence that** the poor were not counted.

Word order matters. *Probably* goes after *be* and before the main verb, but before a negative auxiliary: *He is probably right · He probably knew · He probably didn't know*. And while *likely* can be followed by *to*-infinitive, *probable* and *possible* cannot: ✗ *The fire is probable to spread* → ✓ *The fire is likely to spread / It is probable that the fire will spread*.

GRAMMAR IN ITALIANO

Aggettivi, avverbi e strutture impersonali. *be likely to* + infinito = «è probabile che...»: *Prices are likely to rise* = «è probabile che i prezzi salgano» (il soggetto inglese è *prices*, non *it*). Solo *likely / unlikely* hanno questa costruzione personale; con *probable* e *possible* serve *it is... that*. Le strutture *it is thought that / he is thought to* (il passivo impersonale di English 3, capitolo 4) sono tipiche della scrittura formale e accademica.

Confronto con l'italiano. «Si pensa che», «pare che», «è probabile che» reggono il congiuntivo; in inglese non c'è congiuntivo: *It is likely that he **is** wrong*. E attenzione all'avverbio: «probabilmente non lo sapeva» = *he probably didn't know* (✗ *he didn't probably know*).

4.4.4 Boosters, hedges and over-claiming

Boosters — *clearly, undoubtedly, certainly, it is evident that, this proves that* — are useful when the evidence is strong. The commonest mistake in student essays is to use them when it is not. One

experiment, one witness or one text rarely *proves* anything; it *suggests*, *indicates* or *supports* a conclusion. Compare:

- ✗ *This experiment proves that Boyle's law is always true.* → ✓ *These results support Boyle's law for air at room temperature.*
- ✗ *Pepys's diary shows that all Londoners panicked.* → ✓ *Pepys's diary suggests that many Londoners were more concerned with saving their goods than with fighting the fire.*
- ✗ *Dryden obviously lied about the fire.* → ✓ *Dryden's account is arguably more optimistic than the evidence allows.*

Do not over-hedge either: *It might perhaps possibly be suggested that the fire may have been quite large* says nothing. One hedge per claim is usually enough, and a well-supported fact needs none: *The fire began on 2 September 1666.*

GRAMMAR IN ITALIANO

Rafforzativi e attenuatori. *clearly, undoubtedly, it is evident that* = certezza; *suggest, indicate, support* = ciò che i dati «indicano» o «confermano». Regola pratica per la scrittura scientifica: **un dato → *suggests*; molti dati concordi → *show*; una dimostrazione → *prove*** (in matematica).

Confronto con l'italiano. Anche l'italiano accademico distingue «dimostra» da «suggerisce», ma usa più spesso il condizionale («i dati indicherebbero»). In inglese il verbo resta all'indicativo e la cautela è nel lessico: *the data* ***indicate***.

ERRORE FREQUENTE

✗ *It is probable that the fire to spread.* / ✗ *The fire is probable to spread.* → ✓ *The fire is likely to spread.* / ✓ *It is probable that the fire will spread.*

✗ *The results seem confirm the law.* → ✓ *The results seem* ***to*** *confirm the law.* · ✗ *He seems to leave yesterday.* → ✓ *He seems* ***to have left*** *yesterday.*

✗ *Evidences suggest…* / ✗ *an evidence* → ✓ *The evidence suggests…* / *a piece of evidence*: *evidence* è non numerabile. *Data* può avere il verbo al plurale (*the data show*, più formale) o al singolare (*the data shows*).

✗ *This proves that Hooke discovered life.* → ✓ *This suggests that…*: in un testo scientifico *prove* è quasi sempre troppo forte.

4.5 Skills: Explaining Science

4.5.1 Vocabulary: science and experiment

These words are the basic tools for talking about any experiment, in physics, chemistry or biology. Learn them with their typical partners (collocations).

Tabella 4.6 Science and experiment: key words and collocations

Word	Meaning	Typical collocations
hypothesis (pl. *hypotheses*)	an idea that can be tested by experiment	*form / test / confirm / reject* a hypothesis
experiment (n. and v.)	a test carried out to discover or prove something	*carry out / do / conduct* an experiment; *experiment on / with* something
observe / observation	watch carefully; what you notice	*make* an observation; *careful* observation
measure / measurement	find the size, amount or degree of something	*take* a measurement; *accurate / precise* measurements
data (uncountable or pl.)	facts and numbers collected for study	*collect / record / analyse* data
evidence (uncountable)	facts that show something is true	*provide / find* evidence *of / for*; *a piece of* evidence
findings (pl.)	what a study discovers	*publish / report* findings; *the findings show / suggest*
theory	a tested explanation of a set of facts	*put forward / develop* a theory; *in theory*
instrument	a tool for precise scientific work	*a measuring* instrument
microscope / telescope	instrument to see very small / very distant things	*look at* something *under* a microscope; *through* a telescope

Word formation: Greek and Latin roots

Scientific English is built from Greek and Latin pieces — and so is scientific Italian. If you know the roots, you can understand words you have never seen, in both languages: *micro-* (small) + *-scope* (look at) = *microscope*, *microscopio*.

Tabella 4.7 Greek and Latin roots in science words, in English and Italian

Root	Meaning	English	Italian
micro- (Gk)	small	microscope, microbe, microphone	microscopio, microbo, microfono
tele- (Gk)	far	telescope, telephone, television	telescopio, telefono, televisione
bio- (Gk)	life	biology, biography, antibiotic	biologia, biografia, antibiotico
geo- (Gk)	earth	geology, geography, geometry	geologia, geografia, geometria
photo- (Gk)	light	photograph, photosynthesis	fotografia, fotosintesi
-scope (Gk)	instrument for looking	periscope, stethoscope	periscopio, stetoscopio
-meter (Gk)	measure	thermometer, barometer, speedometer	termometro, barometro, tachimetro
-logy (Gk)	study of, science of	biology, zoology, technology	biologia, zoologia, tecnologia

Watch the stress: in English it often moves when a suffix is added — *PHOtograph*, *phoTOGraphy*, *photoGRAPHic*; *TELescope* is stressed differently from Italian *telesCOpio* — and spelling: English *ph* for Italian *f*, *th* for *t*, *y* for *i*.

4.5.2 Listening: The Monument Walk

Before you listen. Look at the map in Figura 4.2. Which places do you think a guided walk about the Great Fire would visit? Then listen (books closed) while two classmates and your teacher read the script. Sam and Callum are on a Year 13 school trip to London.

Tabella 4.8 Listening script — The Monument Walk

Guide	Right, everyone, gather round. This column is the Monument, designed by Christopher Wren and Robert Hooke and finished in 1677. It's 202 feet high — about 61 metres — and it stands 202 feet from the place where the Great Fire began, in Pudding Lane, just behind you.
Callum	So the height is the same as the distance? That can't be a coincidence.
Guide	It isn't. If you laid the column down towards the east, the gilded flames at the top would land roughly on the site of the bakery. Now, the fire started some time after midnight on Sunday the second of September, 1666. Can anyone tell me why it spread so fast?
Sam	It had been a dry summer, hadn't it? Pepys calls it "so long a drought".
Guide	Exactly. That was the first cause. The second was the buildings: most houses were made of timber, and the upper floors stuck out over the street, so the houses on opposite sides almost touched. Fire could jump across a lane. Third, down there by the river, Thames Street was lined with warehouses full of oil, tar, coal and brandy.
Callum	So once it reached the river, it had fuel everywhere.
Guide	That's right. And finally, the wind. A strong east wind blew for days and drove the flames west, towards St Paul's. As a result, the fire grew faster than people could pull houses down in front of it.
Sam	Why didn't they use water?
Guide	They tried, with buckets and small hand-pumped fire engines, but the pipes from the river were soon damaged and the heat was too great. The only method that worked was to create firebreaks. Later in the week houses were blown up with gunpowder, and when the wind dropped, the fire was finally stopped.
Callum	How many people died?
Guide	Officially, very few — the number usually quoted is six. But historians think the true figure was probably higher: many poor people were never recorded. What we do know is that about 13,200 houses and 87 churches were destroyed.
Sam	And the inscription on the base? Something about Catholics?
Guide	Well spotted. In 1681 a line was added that blamed the fire on the "Popish faction". It was false, and it was finally removed in 1830. There's one more thing: Hooke also designed the column as a scientific instrument. There's a laboratory underneath, and the hollow centre was meant for experiments. Now — there are 311 steps to the top. Who's coming up?

After you listen. 1 Complete the notes: height of the Monument ____ ; distance from Pudding Lane ____ ; date the fire started ____ ; houses destroyed ____ ; steps to the top ____ . 2 List the four causes the guide gives for the rapid spread of the fire, in order. 3 Which phrases does the guide use to link causes and results? 4 Find two hedges in the guide's answer about the number of deaths. 5 What was wrong with the inscription added in 1681?

4.5.3 Speaking: explaining a process and its causes

Scientists, engineers and doctors constantly explain *how* something happens and *why*. A good oral explanation has a clear order (first, then, finally), shows cause and effect, and checks that the listener is following.

Tabella 4.9 Useful language — explaining a process and its causes

Function	Expressions
Introducing	I'm going to explain how… works / why… happens. · Basically, the idea is that…
Ordering the steps	First of all, … · The next stage is… · Once…, … · At this point… · Finally, …
Cause	The reason why… is that… · This is because… · …is caused by… · Due to / Because of the wind, …
Effect	This leads to / results in… · As a result, … · Consequently, … · This means that…
Condition	If…, then… · As long as…, … · Unless…, …
Checking	Does that make sense? · Is that clear so far? · In other words, …

- **Task 1 (pairs, 2 minutes each).** Student A explains why the Great Fire spread so fast (use the four causes from the listening); Student B explains how it was stopped. Use at least three cause-and-effect expressions each.
- **Task 2 (individual, 2 minutes).** Explain how a compound microscope makes a small object visible, using Figura 4.3: light, object, objective lens, eyepiece, eye. Finish by checking that your listener has understood.

4.5.4 Writing: an abstract of an experiment

An **abstract** (*abstract, riassunto iniziale*) is a short summary, usually 150–250 words, that opens a scientific paper or report. Busy readers read it to decide whether the whole paper is useful to them, so it must stand alone: it states the aim, the method, the main results with numbers, and the conclusion, in that order. It is written in an impersonal, hedged style. Giulia wrote this abstract after a physics lab with her classmate Elena Conti.

Tabella 4.10 Model text — an abstract of a school experiment

Testing Boyle's law with a syringe and a pressure sensor

The aim of this experiment was to test whether the pressure of a fixed amount of air is inversely proportional to its volume at constant temperature, as Boyle's law states. A plastic syringe containing 60 cm³ of air was connected to a digital pressure sensor. The plunger was pushed in slowly, and the pressure was recorded at volumes of 60, 50, 40, 30 and 20 cm³, after waiting about 30 seconds each time so that the air could return to room temperature. The pressure rose from 100 kPa to 290 kPa, and the product of pressure and volume remained approximately constant, between 5.80 and 6.00 × 10³ kPa·cm³ (mean 5.91 × 10³). A graph of pressure against 1/*V* was close to a straight line through the origin. These results support Boyle's law within the precision of our instruments. The small decrease in *pV* at the lowest volumes may be due to the air inside the tube connecting the syringe to the sensor, which was not included in the measured volume, or possibly to a slight leak. Repeating the experiment with a shorter tube would help to test this explanation. (191 words)

Structure. Title (what was tested) · **aim** (*The aim of this experiment was to…*) · **method**, in the past passive (*was connected, was recorded*) · **results**, with real numbers and units · **conclusion**, hedged (*These results support…*) · **limitations** and a suggestion (*may be due to… possibly… would help*). The data are plotted in Figura 4.5.

Checklist. ✓ one paragraph, 150–200 words · ✓ aim, method, results, conclusion in this order · ✓ numbers with units · ✓ passive for the method · ✓ at least two hedges, no *prove* · ✓ no personal comments (*it was fun*) and no references to figures inside the abstract.

Task. Write an abstract (150–200 words) of an experiment you have done in a physics, chemistry or biology lab this year — for example measuring the period of a pendulum, observing onion cells under a microscope, or the reaction of a metal with an acid. If you prefer, use these notes: *aim — does the period of a pendulum depend on its length? · method — lengths 0.20–1.00 m, 10 oscillations timed three times · results — period from 0.90 s to 2.01 s; T^2 proportional to length · limitation — reaction time when using the stopwatch.*

LEARNING TO LEARN

Reading a scientific text in English. Do not start at the first line. Scientists read in this order:

1. **Title and abstract**: what was the question, and what was the answer?
2. **Figures and tables** with their captions: the results are often clearer in a graph than in the text.
3. **Conclusion** (or discussion): what do the authors claim — and how strongly? Look for the hedges.
4. **Method** last, and only if you need it: how exactly was it done?

Try it on a short article from a science magazine for students, or on the *Philosophical Transactions* archive of the Royal Society online (check that you are on the Society's own website). The same order works for a scientific text in Italian, and for the dense Latin of a Renaissance scientist: first understand what the author claims, then how.

4.6 Connections: Two Academies, One Method

The Royal Society was not the first scientific academy of the century, and its Fellows knew it. In Rome the **Accademia dei Lincei** (1603) had counted Galileo among its members, and in Florence, three years before the London society, Grand Duke Ferdinando II de' Medici and his brother Prince Leopoldo founded the **Accademia del Cimento** (1657–1667), "the academy of the test". Its members, among them Galileo's pupil Vincenzo Viviani and the physiologist Giovanni Alfonso Borelli, measured temperature, air pressure, the speed of sound and the freezing of water with new instruments made by Florentine glassmakers. In 1667 they published the results as *Saggi di naturali esperienze*; the book was translated into English in 1684 by a Fellow of the Royal Society.

The Cimento's motto was *Provando e riprovando*. The words come from Dante, *Paradiso* III.3, where Beatrice has shown the poet a truth by argument and counter-argument:

> *Quel sol che pria d'amor mi scaldò 'l petto,*
> *di bella verità m'avea scoverto,*
> *provando e riprovando, il dolce aspetto*
>
> — Dante Alighieri, *Paradiso* III.1–3 (text of the Petrocchi edition as given on it.wikisource.org)

("That sun which first warmed my breast with love had uncovered to me, proving and disproving, the sweet face of beautiful truth" — translation by the editors.) For Dante *provando e riprovando* meant demonstrating and refuting in a debate; the Florentine academicians gave it a new meaning, "testing and testing again". The two mottoes, *Nullius in verba* and *Provando e riprovando*, say the same thing from two sides: do not trust authority, trust repeated experiment.

Behind both academies stands **Galileo**. In *Il Saggiatore* (1623), "the assayer", he had written:

> *La filosofia è scritta in questo grandissimo libro che continuamente ci sta aperto innanzi a gli occhi (io dico l'universo), ma non si può intendere se prima non s'impara a intender la lingua, e conoscer i caratteri, ne' quali è scritto. Egli è scritto in lingua matematica, e i caratteri son triangoli, cerchi, ed altre figure geometriche* [...]
>
> — Galileo Galilei, *Il Saggiatore* (1623), § 6 (text as given on it.wikisource.org, checked against the Favaro edition on the same site)

("Philosophy is written in this very great book which lies always open before our eyes — I mean the universe — but it cannot be understood unless we first learn to understand the language and know the characters in which it is written. It is written in the language of mathematics, and its characters are triangles, circles and other geometrical figures" — translation by the editors.) Compare the two traditions. Galileo puts mathematics first: nature is a book written in geometry. The English Fellows, and Locke after them, put experience first: collect observations,

then look for laws. Boyle's law, which you meet below, needs both: careful measurements, and a mathematical relation that fits them.

COLLEGAMENTI

Biology: Hooke and the cell. Hooke was the first to use the word *cell* for these structures, in *Micrographia* (1665). He estimated that cork has about 60 cells in 1/18 of an inch, that is 1,080 per inch — which gives about 23.5 µm, a few hundredths of a millimetre, per cell. In biology a **cell** (*cellula*) is the smallest unit of a living organism; the cork cells Hooke saw were dead, and only their walls remained. The Dutch microscopist Antoni van Leeuwenhoek, also in correspondence with the Royal Society, observed living single-celled organisms from the 1670s; the cell theory was formulated in the 1830s.

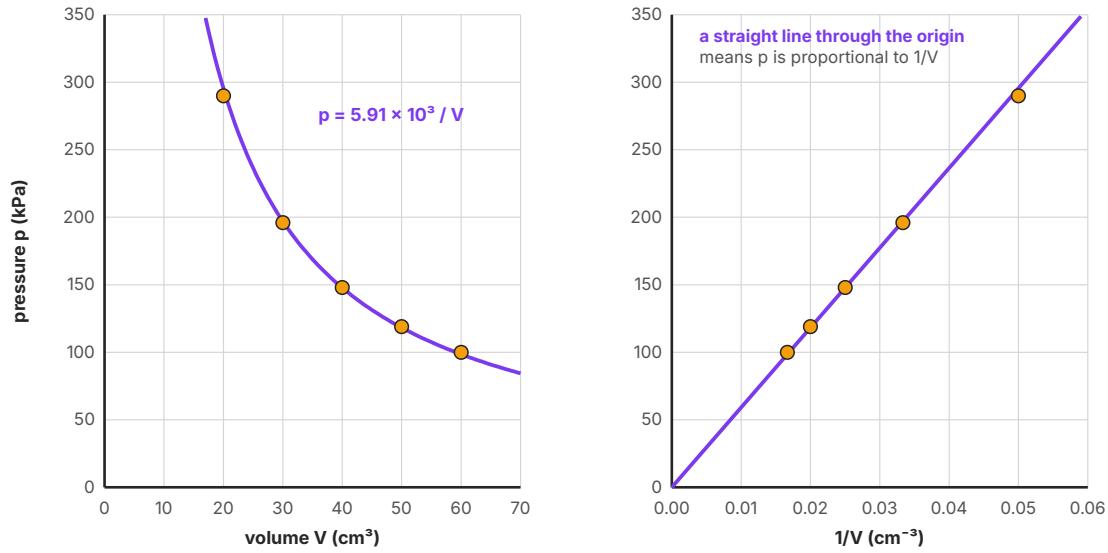
Physics: Boyle's law. In 1662 Robert Boyle trapped air in the closed short arm of a J-shaped glass tube and added mercury to the long arm. The more mercury he poured in, the more the air was compressed. He found that **for a fixed amount of gas at constant temperature, pressure × volume is constant**: halve the volume and the pressure doubles. This is **Boyle's law** (*legge di Boyle*), in Italy usually called the *legge di Boyle-Mariotte*, because the French physicist Edme Mariotte found it independently in 1676.

$$p_1 V_1 = p_2 V_2 \text{ (fixed amount of gas, constant temperature)}$$

ESEMPIO SVOLTO

Using Boyle's law. A syringe contains 40 cm^3 of air at atmospheric pressure, 100 kPa. The nozzle is closed and the plunger is pushed in until the volume is 25 cm^3, at the same temperature. What is the new pressure?

Step 1. Write the data: p_1 = 100 kPa, V_1 = 40 cm^3, V_2 = 25 cm^3. **Step 2.** Boyle's law: $p_2 = p_1 V_1 / V_2$ = 100 × 40 / 25 = **160 kPa**. **Step 3.** Check: the volume has decreased (by a factor of 1.6), so the pressure must increase by the same factor: 100 × 1.6 = 160 kPa ✓. **In words:** *When the volume is reduced from 40 to 25 cm^3, the pressure rises from 100 to 160 kPa, because pressure and volume are inversely proportional.*



Amber points: Giulia and Elena's data (see the model abstract). Violet: Boyle's law with the mean value of pV.

Figura 4.5 Giulia and Elena's data for air in a syringe (amber points) and Boyle's law (violet), with the mean value of pV, 5.91 × 10³ kPa·cm³. Left: pressure against volume, a hyperbola. Right: pressure against $1/V$, a straight line through the origin.

SINTESI

- The **Restoration** (1660) brought back the monarchy with Charles II, reopened the theatres and restored the Church of England.
- The **Royal Society** (1660; charters 1662–63; motto *Nullius in verba*) promoted experiment, witnesses and published reports: the method of **empiricism**.
- London suffered the **Great Plague** (1665) and the **Great Fire** (2–6 September 1666), which destroyed about 13,200 houses and old St Paul's; the true death toll is unknown.
- Rebuilding brought brick and stone houses, Wren's 51 churches, the new **St Paul's** (1675–1710) and the **Monument**.
- The **Glorious Revolution** (1688–89) replaced James II with William and Mary; the **Bill of Rights** made England a **constitutional monarchy**, and **Locke** defended government by consent and the mind as "white paper".
- The reopened theatres had **actresses** for the first time; the **comedy of manners** (Wycherley, Congreve's *The Way of the World*, 1700) laughed at fashionable society.
- **Dryden**, the first official **Poet Laureate** (1668), wrote public poetry (*Annus Mirabilis*, 1667) and satire in heroic couplets (*MacFlecknoe*).
- **Pepys**'s **diary** (1660–1669), written in shorthand and published in 1825, mixes great events and private life.
- Hooke's *Micrographia* (1665) described the first "cells"; Sprat's ideal of **plain style** shaped English scientific prose.
- **Hedges** (*seem, tend to, may, it is likely that, suggest*) and **boosters** (*clearly, undoubtedly*) express stance; good academic writing claims exactly what the evidence supports.
- An **abstract** gives aim, method, results and conclusion in 150–250 words, in an impersonal, hedged style.
- The Royal Society and the Florentine **Accademia del Cimento** (*Provando e riprovando*) shared Galileo's experimental method; **Boyle's law**: pV = constant at constant temperature.

ESERCIZI

History and Literature

1. ● When did Charles II enter London at the Restoration?
   - **A.** 29 May 1660
   - **B.** 30 January 1649
   - **C.** 2 September 1666
   - **D.** 5 November 1688

2. ● What does the Royal Society's motto *Nullius in verba* mean?

   A. Nothing is certain

   B. Take nobody's word for it

   C. Knowledge is power

   D. Testing and testing again

3. ● Which statement about the Great Fire of London is correct?

   A. It started in the king's palace at Whitehall.

   B. The records prove that only six people died.

   C. It destroyed old St Paul's and about 13,200 houses.

   D. It ended when the Thames flooded the City.

4. ● Why are the events of 1688–89 called the "Glorious" Revolution?

   A. Because William won a great battle in London

   B. Because James II was executed in public

   C. Because the Royal Society supported William

   D. Because in England power changed hands with little fighting and Parliament set conditions

5. ●● True or false? Correct the false statements. a Pepys wrote his diary in shorthand so that it could be published quickly. b Dryden was the first official Poet Laureate. c The new St Paul's was finished in 1667. d In *Two Treatises of Government* Locke argued that government rests on the consent of the governed. e Women's parts were played by boys in the Restoration theatre. f Robert Hooke was the Royal Society's Curator of Experiments.

6. ●● Match the authors (1–6) with the works (a–f), then give the date of each. 1 Samuel Pepys · 2 Robert Hooke · 3 John Dryden · 4 Thomas Sprat · 5 John Locke · 6 William Congreve — a *History of the Royal Society* · b *The Way of the World* · c *Micrographia* · d the diary · e *An Essay Concerning Human Understanding* · f *Annus Mirabilis*

7. ●● Explain each term in one or two sentences in your own words: a comedy of manners · b Poet Laureate · c diary · d plain style · e empiricism · f constitutional monarchy.

8. ●●● Answer in 50–70 words. a Why did the Great Fire spread so fast? b Why did the Royal Society care about the style of its members' prose? c How did the Bill of Rights change the power of the monarch?

Text Analysis

9. ● T1. a What time did Jane wake Pepys, and why did he go back to bed? b What did Jane tell him later that morning? c Where did Pepys go to see the fire better? d Who told him where the fire had started? e What did he see happening to the pigeons?

10. ●● T1. Find in the text: a an old past form of *begin* · b an old form of *has* · c a word for "at once" whose meaning has changed · d an emphatic form of the past simple · e an adjective used as an adverb to intensify another adjective.

11. ●● T2. a Why did Hooke put the cork on a *black* plate? b How did he light it? c What does he compare the structure of cork to? d Find two expressions with which he limits his claim to be the first to see the pores. e Rewrite *I no sooner discern'd these… but me thought…* in modern English, starting *No sooner had I…*.

12. ●●● T2 and the Collegamenti box. Hooke counted about 60 cells in 1/18 of an inch. a How many cells is that in one inch? b Hooke then estimated the cells in a square inch and in a cubic inch: check his numbers (1,166,400 and 1,259,712,000). c Using 1 inch = 2.54 cm, calculate the length of one cell in micrometres (µm), to the nearest micrometre.

13. ●● T3. Copy the line *Methinks already from this chemic flame*. Divide it into syllables, mark the stressed syllables in CAPITALS and the feet with a vertical line. What metre is it? Then give the rhyme scheme of stanza 293.

14. ●● T3. a Which figure of speech dominates stanza 218? Quote three words that build it. b Explain the metaphor of the *chemic flame*. c Why does Dryden compare London with Mexico?

15. ●●● Write a PEE paragraph (80–100 words) on this point: "Pepys and Dryden see the same fire with very different eyes."

Language

16. ● Make each claim more cautious, using the word in brackets. a The fire started in the bakery. (APPEAR) b Diarists write quickly. (TEND) c The heat destroyed the remains of many victims. (MAY) d The data show that pressure and volume are inversely proportional. (SUGGEST) e Pepys is the most vivid witness of the fire. (ARGUABLY) f More people died than the records show. (LIKELY)

17. ● Choose the correct option. a The results *prove / suggest* that the law holds, but we only tested five volumes. b Cork *seems / is seemed* to contain air. c Hooke was *probably / probable* the first to see the pores. d The real death toll is *likely / probable* to have been higher. e *It is possible / It is likely to* that the inscription was added for political reasons. f Pepys *undoubtedly / perhaps* exaggerated a little — I can't be sure.

18. ●● Rewrite the sentences with the impersonal structure in brackets (English 3, chapter 4). a People think the fire began after midnight. (It is thought…) b People say that the king himself helped to fight the fire. (The king is said…) c Historians believe that the plague killed about 100,000 people. (The plague is believed…) d Someone has suggested that the wind was the main cause. (It has been suggested…) e Experts estimate that the fire destroyed 87 churches. (The fire is estimated…)

19. ●● Correct the mistakes (✗). a The fire is probable to spread to the cathedral. b The diary seems confirm what other sources say. c On the first night of the fire Pepys seems to underestimate it. d Evidences suggest that the poor were not counted. e He didn't probably know the baker. f Hooke tends seeing things that others missed.

20. ●● Write hedged sentences from the notes. a cork / appear / contain / millions of cells b the plague / likely / kill / one Londoner in five c it / possible / the fire / start / a spark from the oven d these figures / suggest / pressure / double / when the volume / halve

21. ●● Put these expressions in order from the most certain (1) to the least certain (6): *might · will certainly · is likely to · could possibly · must · may*. Then write one sentence about the Great Fire with each.

22. ●●● This paragraph over-claims. Rewrite it in an academic style, with suitable hedges and no more than one booster. *Pepys's diary proves that the Lord Mayor was totally incompetent. Everybody in London only thought about saving their goods, and nobody fought the fire. This shows that the whole disaster was caused by bad government.*

23. ●● Translate into English, using hedges. a È probabile che il fuoco sia partito da un forno. b I dati sembrano confermare la legge di Boyle. c Secondo alcuni storici, la peste avrebbe ucciso circa un quinto degli abitanti.

24. ●● Complete with *likely*, *probably*, *appears*, *tend* or *suggest*. a Scientific papers _____ to use the passive. b The fire _____ to have been stopped by firebreaks. c These results _____ that cork is mostly air. d London was _____ the largest city in northern Europe. e The cathedral is _____ to remain closed for years.

Vocabulary

25. ● Complete with *hypothesis, data, findings, evidence, measurements, instrument*. a Boyle's _____ was that air behaves like a spring. b Hooke took careful _____ of each cell. c The Royal Society published the _____ of its Fellows in the *Philosophical Transactions*. d A thermometer is an _____ for measuring temperature. e There is no _____ that the fire was started on purpose. f We recorded the _____ in a table.

26. ● Match the verbs (1–6) with the nouns (a–f) to make collocations. Some verbs match more than one noun. 1 carry out · 2 test · 3 collect · 4 take · 5 publish · 6 put forward — a a theory · b an experiment · c data · d a hypothesis · e findings · f a measurement

27. ●● Use the roots in the Word formation table. a What is the study of life? b What instrument measures temperature? c What do we call an instrument for looking at the stars? d What is *geo-* + *-metry* in Italian? e A *hygrometer* measures water in the air: what do you think *hygro-* means? f Explain *photosynthesis* from its parts.

28. ●● Mark the stress in CAPITALS and give the Italian word: a photograph / photography · b thermometer · c biology / biological · d telescope / telescopic.

Writing and Speaking

29. ●●● Writing. Write an abstract (150–200 words) of an experiment you have done this year, or use the pendulum notes in the Writing section. Follow the structure of Giulia's model and the checklist.

30. ●● Speaking. In two minutes, explain how the Great Fire of London was finally stopped, giving at least three causes or effects. Use expressions from the Useful language table.

Towards B2

31. ●● Multiple-choice cloze. Choose the correct answer (A, B, C or D) for each gap. In 1660 a group of natural philosophers decided to (1) _____ regular meetings in London. Two years later the king (2) _____ them a royal charter. The Fellows did not simply discuss ideas: they (3) _____ out experiments in front of witnesses. Hooke's *Micrographia* was so popular that Pepys sat up (4) _____ two in the morning reading it. (5) _____ , not everyone was impressed, and the king laughed at their attempts to weigh air. Their results, (6) _____ , laid the foundations of modern science. — 1 A make B hold C do D take · 2 A gave B made C let D put · 3 A took B made C carried D brought · 4 A by B since C until D for · 5 A However B Therefore C Moreover D In addition · 6 A although B nevertheless C despite D yet

32. ●● Word formation cloze. Use the word in brackets to form a word that fits the gap. Hooke's (1) _____ (OBSERVE) of cork were made with a (2) _____ (SCIENCE) instrument of his own design. He gave a careful (3) _____ (DESCRIBE) of the "cells" and compared them to a honeycomb. His drawings were (4) _____ (EXTRAORDINARY) detailed. Some readers found his claims (5) _____ (BELIEVE), but the Royal Society valued (6) _____ (ACCURATE) above everything else.

33. ●●● Key-word transformation. Complete the second sentence so that it means the same as the first. Use the word in bold and between two and five words. a It is likely that the true number of deaths was higher. **TO** → The true number of deaths _____ higher. b People say that the fire began in a bakery. **SAID** → The fire _____ in a bakery. c Perhaps the oven was not put out properly. **MAY** → The oven _____ out properly. d As soon as Hooke saw the pores, he understood why cork is light. **SOONER** → No _____ the pores than he understood why cork is light. e It seems that Pepys underestimated the fire at first. **HAVE** → Pepys seems _____ the fire at first.

PER APPROFONDIRE

- [MOR] K. O. Morgan (ed.), *The Oxford History of Britain*: the chapter on the later Stuarts, from the Restoration to the Glorious Revolution.
- [POR] R. Porter, *Enlightenment: Britain and the Creation of the Modern World*: the chapters on science, Locke and the culture of improvement.
- [NOR] S. Greenblatt (ed.), *The Norton Anthology of English Literature*, the Restoration and the Eighteenth Century: Pepys, Dryden, Congreve and the Royal Society.
- [SAN] A. Sanders, *The Short Oxford History of English Literature*: the chapter on Restoration literature.
- [HEW] M. Hewings, *Advanced Grammar in Use*, and [SWA] M. Swan, *Practical English Usage*: the entries on *seem / appear*, *likely*, *it is said that…* and hedging in academic writing.

Glossario del capitolo

Abstract
abstract, riassunto — a short summary of the aim, method, results and conclusion at the start of a scientific paper.

Bill of Rights
Carta dei diritti (1689) — the act of Parliament that limited the powers of the monarch after the Glorious Revolution.

Booster
rafforzativo — a word that makes a claim stronger (*clearly, undoubtedly*).

Boyle's law
legge di Boyle(-Mariotte) — for a fixed amount of gas at constant temperature, pressure × volume is constant.

Comedy of manners
commedia di costume — a witty comedy that satirises the behaviour and conversation of fashionable society.

Compound microscope
microscopio composto — a microscope with two or more lenses, the eyepiece magnifying the image made by the objective.

Constitutional monarchy
monarchia costituzionale — a monarchy in which the ruler's power is limited by law and by an elected parliament.

Diary
diario — a private record written day by day of events, thoughts and feelings.

Empiricism
empirismo — the view that knowledge comes from experience, observation and experiment.

Firebreak
tagliafuoco — a gap where everything that can burn has been removed, to stop a fire spreading.

Fop
damerino, bellimbusto — a man too concerned with fashion and appearance; a stock character of Restoration comedy.

Glorious Revolution
Gloriosa Rivoluzione — the replacement of James II by William III and Mary II in 1688–89, with little fighting in England.

Hedge
attenuatore — a word or structure that makes a claim more cautious (*seem, may, it is likely that*).

Hypothesis
ipotesi — an idea that can be tested by experiment (pl. *hypotheses*).

Plain style
stile piano, semplice — clear, concrete prose without ornament, the ideal of the Royal Society.

Poet Laureate
poeta laureato — the poet appointed by the Crown to write verse for national occasions; Dryden was the first official one (1668).

Restoration
Restaurazione — the return of the monarchy in England in 1660 with Charles II; also the period of his reign (1660–1685).

Royal Society
Royal Society — the scientific society founded in London in 1660 and chartered by Charles II; motto *Nullius in verba*.

Shorthand
stenografia — a system of quick symbols for writing words and sounds.

Soluzioni

1. A (29 May 1660, his thirtieth birthday).

2. B (adapted from Horace; *Provando e riprovando* is the motto of the Accademia del Cimento).

3. C (the official death toll was low, but the real number is unknown; it started in Pudding Lane and stopped when the wind dropped and firebreaks were made).

4. D.

5. a F — he wrote it in shorthand so that others could not read it; it was published only in 1825. b T (1668). c F — it was begun in 1675 and finished in 1710. d T. e F — actresses now played women's parts (patent of 1662). f T (from 1662).

6. 1 d (1660–1669) · 2 c (1665) · 3 f (1667) · 4 a (1667) · 5 e (1689, dated 1690) · 6 b (1700).

7. Model answers: a a witty comedy of fashionable London society that laughs at the way people talk, flirt, marry and seek money and reputation. b the poet appointed and paid by the Crown to write verse for public occasions; Dryden was the first official one (1668). c a private day-by-day record of events, thoughts and feelings, written soon after they happen and not meant for publication. d the clear, concrete, unornamented prose the Royal Society demanded, "a close, naked, natural way of speaking". e the idea that knowledge comes from experience — observation and experiment — rather than from authority or pure reasoning. f a monarchy in which the ruler's power is limited by laws and by an elected parliament.

8. Model answers: a The summer had been long and dry; most houses were of timber and very close together; the warehouses by the river were full of oil, tar and spirits; and a strong east wind drove the flames west for days. Firefighting with buckets and small engines could not keep up, so houses had to be pulled down or blown up. b The Fellows wanted reports that others could check and repeat. Ornament and digressions hid the facts, so Sprat says they demanded "a close, naked, natural way of speaking", like the language of artisans and merchants: clear sentences and concrete words, facts before opinions. c It limited the monarch by law: the king or queen could not suspend laws, raise taxes or keep an army in peacetime without Parliament's consent, and elections and debates had to be free. Power was now shared with Parliament: a constitutional monarchy.

9. a About three in the morning; he thought the fire was far enough away ("far enough off") to be no danger. b That more than 300 houses had burnt during the night and that the fire was burning all Fish Street, by London Bridge. c To the Tower, up on one of its high places. d The Lieutenant of the Tower. e They did not want to leave their nests, flew round the windows and balconies until their wings were burnt, and fell.

10. a *begun* (it begun = it began) · b *hath* · c *presently* (= at once; today = soon) · d *I did see* · e *infinite* in *an infinite great fire* (= an extremely great fire).

11. a Because cork is white: a dark background gives contrast and makes the thin slice visible. b He concentrated the light on it with a deep plano-convex lens. c To a honeycomb (the pores are like "little Boxes"). d *perhaps* ("and perhaps, that were ever seen") and "for I had not met with any Writer or Person, that had made any mention of them". e *No sooner had I seen (discerned) these than it seemed to me that I had understood…* (inversion after *no sooner*, chapter 3; modern English uses *than*, not *but*).

12. a $60 \times 18 = 1{,}080$ per inch. b $1{,}080^2 = 1{,}166{,}400$ per square inch ✓; $1{,}080^3 = 1{,}259{,}712{,}000$ per cubic inch ✓ — Hooke's arithmetic is correct. c 2.54 cm = 25,400 µm; 25,400 / 1,080 ≈ 23.5 µm, so about 24 µm per cell to the nearest micrometre.

13. me-THINKS | al-REA | dy FROM | this CHEM | ic FLAME: ten syllables, five iambs — iambic pentameter (the third foot has a light stress on *from*). Rhyme scheme of stanza 293: *abab* (flame / mould / name / gold).

14. a Personification: the fire is a living creature, an "infant monster" — *crept*, *fed*, *walk'd boldly upright* (also *devouring*, *exalted head*). b In alchemy fire was used to turn base metals into gold; the fire that destroyed London will "refine" it into a richer, finer city ("of more precious mould"). c Because Mexico, the city Dryden's note identifies, was famous for the silver and gold of Spain's American empire: the new London will be as rich, "with silver paved".

15. Model: *Pepys and Dryden describe the same fire, but for different purposes. Pepys writes privately and records what he actually sees: "an infinite great fire" and pigeons that fall "burned, their wings". His tone is anxious and personal, "with my heart full of trouble". Dryden, writing for the public, turns the fire into an "infant monster" and then into a "chemic flame" that will create "a city of more precious mould". Pepys gives us the experience of the disaster; Dryden gives it a political meaning, national rebirth under the king.* (93 words)

16. Model answers: a The fire appears to have started in the bakery. / It appears that the fire started in the bakery. b Diarists tend to write quickly. c The heat may have destroyed the remains of many victims. d The data suggest that pressure and volume are inversely proportional. e Pepys is arguably the most vivid witness of the fire. f It is likely that more people died than the records show. / More people are likely to have died than the records show.

17. a suggest · b seems · c probably · d likely · e It is possible · f perhaps.

18. a It is thought that the fire began after midnight. b The king is said to have helped to fight the fire. c The plague is believed to have killed about 100,000 people. d It has been suggested that the wind was the main cause. e The fire is estimated to have destroyed 87 churches.

19. a The fire is likely to spread to the cathedral (or: It is probable that the fire will spread...). b The diary seems to confirm... c On the first night of the fire Pepys seems to have underestimated it. d The evidence suggests (or: Some evidence suggests) that the poor were not counted. e He probably didn't know the baker. f Hooke tends to see things that others missed.

20. Model answers: a Cork appears to contain millions of cells. b The plague is likely to have killed one Londoner in five. / It is likely that the plague killed one Londoner in five. c It is possible that the fire started from a spark from the oven. d These figures suggest that the pressure doubles when the volume is halved.

21. 1 will certainly · 2 must · 3 is likely to · 4 may · 5 might · 6 could possibly. (*May* and *might* are close; *might* is usually slightly less sure.) Sentences: open answers, e.g. *A fire in a timber city will certainly spread if the wind is strong.*

22. Model: *Pepys's diary suggests that the Lord Mayor was unable to control the situation: he seemed "spent" and complained that people would not obey him. According to Pepys, many Londoners appear to have been more concerned with saving their goods than with fighting the fire. This evidence indicates that poor organisation may have contributed to the disaster, although the dry weather, the timber houses and the wind clearly played a major part.* (One booster: *clearly*, justified by several sources.)

23. a It is likely (probable) that the fire started in an oven. / The fire is likely to have started in an oven. b The data seem (seems) to confirm Boyle's law. c According to some historians, the plague may have killed about a fifth of the inhabitants. / Some historians believe that the plague killed about a fifth of the population. (Not ✗ *would have killed*.)

24. a tend · b appears · c suggest · d probably · e likely.

25. a hypothesis · b measurements · c findings · d instrument · e evidence · f data.

26. 1 b (carry out an experiment) · 2 d, a (test a hypothesis / a theory) · 3 c (collect data) · 4 f (take a measurement) · 5 e (publish findings) · 6 a, d (put forward a theory / a hypothesis).

27. a biology · b a thermometer · c a telescope · d *geometria* · e water, moisture (*igro-* in Italian: *igrometro*) · f *photo-* (light) + *synthesis* (putting together): the process by which plants make food using light.

28. a PHOtograph, phoTOGraphy (*fotografia*) · b therMOmeter (*termometro*) · c biOLogy, bioLOGical (*biologia, biologico*) · d TELescope, teleSCOPic (*telescopio, telescopico*).

29. Guidance (open answer): one paragraph, 150–200 words; title; aim (*The aim of this experiment was to…*); method in the passive; results with numbers and units (pendulum notes: period from 0.90 s at 0.20 m to 2.01 s at 1.00 m; T^2 approximately proportional to length); hedged conclusion (*These results suggest / support…*); limitation (*The main source of error is likely to be reaction time…*) and a suggestion (e.g. timing more oscillations, using a light gate). Check the checklist: no *prove*, no personal comments.

30. Model: *I'm going to explain how the fire was finally stopped. First of all, the authorities realised that water alone could not put it out, because the pipes were damaged and the heat was too great. The only solution was to remove the fuel. As a result, whole rows of houses were pulled down with hooks, and later blown up with gunpowder, to create firebreaks — gaps with nothing left to burn. At the same time, the strong east wind dropped on the fifth of September. This meant that the flames could no longer jump across the gaps. Consequently, the fire was under control by the sixth. Does that make sense?*

31. 1 B (hold) · 2 A (gave) · 3 C (carried) · 4 C (until) · 5 A (However) · 6 B (nevertheless).

32. 1 observations · 2 scientific · 3 description · 4 extraordinarily · 5 unbelievable · 6 accuracy.

33. a is likely to have been · b is said to have begun (started) · c may not have been put · d sooner had Hooke seen · e to have underestimated.