

# CULTURE AND SCIENCE

## *Bioethics and Responsibility in Nineteenth-Century Science Fiction*

Teaching material for Year 5 — Technical English (Healthcare Biotechnology)

### Overview of the module

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Mary Shelley's *Frankenstein* (1818) and Robert Louis Stevenson's *The Strange Case of Dr Jekyll and Mr Hyde* (1886) are two founding texts of modern science fiction and, together, two excellent case studies for introducing the principles of contemporary bioethics through Technical English. Both stories tell of scientists who cross a boundary without foreseeing the consequences: Victor Frankenstein creates life and abandons his creature; Henry Jekyll experiments on himself with a compound that alters his identity, eventually losing control of it.

The module offers two complementary focuses:

- Frankenstein → Bioethics and responsibility (the scientist's responsibility towards what he creates).
- Jekyll and Hyde → Individual responsibility and the limits of experimentation (the scientist's responsibility towards himself and society when experimentation escapes control).

Each section includes: historical and scientific background, original extracts with reading guidance, key technical vocabulary, analysis questions and a hands-on activity conducted in English. The module ends with a real contemporary case and a comparative summary activity.

### Language aims (Technical English)

- Use and recognise specialised lexis related to biotechnology, clinical research and ethics (informed consent, ethics committee, peer review, precautionary principle, follow-up).
- Read and analyse authentic 19th-century literary English, comparing its register with that of a modern scientific report.
- Produce spoken argumentation in English (debate) and written argumentation (position paper, guidelines) using appropriate technical register.

## Part 1 — Mary Shelley, *Frankenstein*: Bioethics and Responsibility

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### 1.1 Background

*Frankenstein* was written in 1816, the "year without a summer" that Mary Shelley spent at Villa Diodati, in a cultural climate shaped by the debate on galvanism: the experiments of Luigi Galvani, and later of Giovanni Aldini, who in 1803 made the limbs of a corpse contract with electric shocks in front of a London audience, fuelled the idea that electricity might "reactivate" life. Victor Frankenstein, a student of natural philosophy at Ingolstadt, works alone, at night, without supervision or dialogue with the scientific community — exactly the condition that modern research ethics committees were created to prevent.

### 1.2 Guided extracts

#### *A. Motivation and ambition (Ch. IV)*

*"I was surprised, that among so many men of genius who had directed their inquiries towards the same science, that I alone should be reserved to discover so astonishing a secret... Life and death*

*appeared to me ideal bounds, which I should first break through, and pour a torrent of light into our dark world."*

Mary Shelley, *Frankenstein*, Ch. IV

Reading guidance: Victor describes his discovery as an individual privilege, not as one step within a collective, verifiable process of research. The language is one of solitary conquest, not of shared, peer-reviewed science.

### ***B. The moment of creation and rejection (Ch. V)***

*"It was already one in the morning; the rain pattered dismally against the panes... I saw the dull yellow eye of the creature open; it breathed hard, and a convulsive motion agitated its limbs... but now that I had finished, the beauty of the dream vanished, and breathless horror and disgust filled my heart... I rushed out of the room."*

Mary Shelley, *Frankenstein*, Ch. V

Reading guidance: at the very moment the experiment succeeds, Victor flees. There is no observation phase, no care, no management of the outcome: post-experimental responsibility, mandatory in any clinical or research protocol today, is entirely absent.

### ***C. The Creature's voice (Ch. X)***

*"Remember, that I am thy creature; I ought to be thy Adam, but I am rather the fallen angel, whom thou drivest from joy for no misdeed... I was benevolent and good; misery made me a fiend."*

Mary Shelley, *Frankenstein*, Ch. X

Reading guidance: the Creature attributes his violence to abandonment, not to an original evil nature. This is the point of view of the "research subject", almost never given space in the scientific texts of the period — and a central issue in today's bioethics, which requires the involvement and protection of the experimental subject.

## **1.3 Key vocabulary**

**to conduct/carry out an experiment** — svolgere un esperimento

**informed consent** — consenso informato

**ethics committee / review board** — comitato etico

**peer review** — revisione tra pari

**follow-up / aftercare** — presa in carico post-sperimentale

**precautionary principle** — principio di precauzione

**to abandon / to disown** — abbandonare / rinnegare

**stigma** — stigma sociale

## **1.4 Analysis questions**

1. Which stages of a modern biomedical research protocol (peer review, ethics committee approval, follow-up) are completely missing from Victor's process?
2. How does Victor's isolation — physical, but also from the scientific community — affect the outcome of his research?
3. The Creature claims he became violent because of social rejection. What parallels can be drawn with the stigma attached to genetic conditions or rare diseases today?

4. Victor feels horror at his own creation immediately after completing it. What does this suggest about the importance of considering consequences before, rather than after, taking scientific action (precautionary principle)?

## 1.5 Hands-on activity

### Activity 1 — The missing ethics committee

Group work (4-5 students). Each group role-plays a modern Research Ethics Committee asked to evaluate, in advance, Victor Frankenstein's research project as it emerges from the novel (creating a living being from corpse tissue, through an unspecified process, carried out in complete autonomy).

Each group must produce a short written opinion in English (max 1 page) answering:

- Does the protocol provide for adequate informed consent? From whom, if the "creation" does not yet exist as a subject?
- What risks — to the researcher, to third parties, to society — have not been assessed?
- Does the project include a post-experimental management plan (follow-up, care, long-term responsibility)?
- Final verdict: approved / approved with major revisions / rejected. Justify in 3-4 lines, in English.

Whole-class feedback: one spokesperson per group reads out the opinion in English; the class compares decisions and discusses any disagreement.

## Part 2 — R. L. Stevenson, Jekyll and Hyde: Individual Responsibility and the Limits of Experimentation

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### 2.1 Background

Published in 1886, Stevenson's novella reflects the late-Victorian scientific climate: the emerging field of psychopharmacology, the post-Darwinian debate on the "double nature" of man, and theories of degeneration. Unlike Victor Frankenstein, Henry Jekyll does not experiment on another being, but on himself: he personally drinks the compound he synthesises in his laboratory, convinced he can chemically separate the "good" and "evil" sides of his own nature — and remain in control of the process.

### 2.2 Guided extracts

#### A. Jekyll's scientific project (Ch. X, "Henry Jekyll's Full Statement of the Case")

*"I began to perceive more deeply than it has ever yet been stated, the trembling immateriality, the mist-like transience, of this seemingly so solid body in which we walk attired... I hazarded the guess that man will be ultimately known for a mere polity of multifarious, incongruous and independent denizens."*

R. L. Stevenson, The Strange Case of Dr Jekyll and Mr Hyde, Ch. X

Reading guidance: Jekyll formulates a bold scientific hypothesis (the "multiple" nature of human identity) and decides to test it directly on himself, without any preliminary trial phase, controlled dosage, or external observation.

#### B. The first transformation and initial euphoria (Ch. X)

*"I was conscious of no repugnance, rather of a leap of welcome. This, too, was myself. It seemed natural and human... I felt younger, lighter, happier in body; within I was conscious of a heady recklessness... and I knew myself, at the first breath of this new life, to be more wicked, tenfold more wicked."*

R. L. Stevenson, The Strange Case of Dr Jekyll and Mr Hyde, Ch. X

Reading guidance: the absence of perceived negative side effects in the first phase is typical of many psychoactive substances — the real risk often appears only with repeated use, by which point the subject has lost the ability to judge what is happening objectively.

#### C. Loss of control (Ch. X)

*"I began to spring the direr side of my nature... Hyde had more than doubled in stature... This was the amazement of that Wednesday which, unlike anything else in my life before or since, struck me utterly speechless... two hours later I was once more Henry Jekyll... I had gone to bed Henry Jekyll, I had awakened Edward Hyde."*

R. L. Stevenson, The Strange Case of Dr Jekyll and Mr Hyde, Ch. X

Reading guidance: the transformations become involuntary and unpredictable — the experimental subject, who was also the experimenter, is no longer able to stop the process he set in motion. A direct parallel with technologies that escape the control of those who designed them.

#### D. Concealment and the belated confession (Ch. X)

*"I began to spring the direr side of my nature... I concealed my pleasures... Men have before hired bravos to transact their crimes, while their own person and reputation sat under shelter. I was the first that ever did so for his pleasures."*

R. L. Stevenson, The Strange Case of Dr Jekyll and Mr Hyde, Ch. X

Reading guidance: Jekyll hides his research from colleagues and friends (Utterson, Lanyon) throughout the novel. His confession only arrives at the end, in written form, when the damage — Carew's murder, his own dissolution — is already done and irreversible.

### 2.3 Key vocabulary

**self-experimentation** — auto-sperimentazione

**side effect** — effetto collaterale

**dosage / dose** — dosaggio

**to lose control (of a process)** — perdere il controllo (di un processo)

**concealment / to conceal** — occultamento / occultare

**irreversible damage** — danno irreversibile

**accountability** — responsabilità nel rendere conto

**transparency** — trasparenza

### 2.4 Analysis questions

5. Jekyll only experiments on himself: does this make his action less ethically problematic than Frankenstein's, or not? Justify your answer.
6. At what precise moment does Jekyll lose the ability to stop the process he started? What does this turning point suggest about risk management?
7. Why does the secrecy Jekyll chooses make the consequences of his experiments worse, rather than reducing them?
8. Dr Lanyon, Jekyll's friend and colleague, dies of shock after witnessing a transformation. What role does the lack of transparency towards the scientific community play in this outcome?

### 2.5 Hands-on activity

#### Activity 2 — Informed consent and self-experimentation

Structured class debate, conducted in English. The class splits into two teams, each defending a position using arguments drawn from the text and from bioethics:

- Motion A: "Anyone who experiments exclusively on themselves does not need external authorisation, because informed consent only exists to protect third parties."
- Motion B: "Even self-experimentation requires external supervision, because no individual can objectively assess the risk to themselves, especially when the substance acts on the central nervous system."
- Debate rules: 4 speeches per team (max 2 minutes each, in English), one final rebuttal, class vote with a one-line written justification each. The teacher may introduce, as a real historical counter-example, cases of physicians who self-inoculated with pathogens to test vaccines (e.g. early yellow fever studies, or Barry Marshall's 1984 self-administration of *Helicobacter pylori*) to show that such cases remain ethically controversial even with a single consenting subject.

## Part 3 — From Fiction to the Present: the He Jiankui Case (2018)

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In November 2018, Chinese researcher He Jiankui announced the birth of the world's first gene-edited babies, Lulu and Nana, obtained by using CRISPR-Cas9 technology to modify the CCR5 gene in human embryos, with the stated aim of making them resistant to HIV.

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|----------------|-------------------------------------------------------------------------------------------------|
| <b>Who</b>     | He Jiankui, researcher, Southern University of Science and Technology, Shenzhen (China)         |
| <b>What</b>    | Germline gene editing (CRISPR-Cas9) on human embryos intended to be born                        |
| <b>How</b>     | Recruitment of couples with an HIV-positive partner, allegedly using falsified ethics documents |
| <b>Outcome</b> | Sentenced to 3 years in prison and fined; two collaborators received lighter sentences          |

Subsequent investigations found that He Jiankui had carried out the research while evading institutional oversight and without valid ethical approval, in pursuit of personal recognition.

The parallel with the two novels is direct:

- like Victor Frankenstein, he worked with very little transparency towards the scientific community and oversight institutions;
- like Jekyll, he moved quickly towards an ambitious scientific goal without properly assessing the long-term effects on the subjects (in this case, the babies, who could give no consent at all);
- in all three cases — two fictional, one historical — responsibility is only acknowledged and sanctioned after the harm, potential or real, has already been caused.

### Synthesis question

If a modern ethics committee could have evaluated, in advance, the projects of Victor Frankenstein, Henry Jekyll and He Jiankui, which shared criteria would have led it to reject all three? Write an answer of about 15 lines, in English, using at least three of the following concepts: informed consent, ethics committee, precautionary principle, transparency/peer review, post-experimental responsibility.

## Part 4 — Comparative Summary Activity

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### Final product (teacher's choice)

- Option A — Written assignment: "Bioethical guidelines Victor Frankenstein and Henry Jekyll should have followed", written in English as a structured document, like a real ethics-committee protocol applied retroactively to the two cases.
- Option B — Structured role-play debate, in English, with assigned roles: a researcher (defending the scientific discovery), a member of an ethics committee, a civil-society representative, and a lawyer for the "research subject" (the Creature / Hyde himself as a victim of his own research).
- Option C — Multimedia presentation, in English, comparing Frankenstein, Jekyll and Hyde and the He Jiankui case, with a final summary table of the bioethical principles violated in each case.

### Comparative summary table

|                                        | Frankenstein                              | Jekyll and Hyde                               | He Jiankui case                                       |
|----------------------------------------|-------------------------------------------|-----------------------------------------------|-------------------------------------------------------|
| <b>Who undergoes the experiment</b>    | Another being (the Creature)              | The experimenter himself                      | Third parties unable to consent (embryos/newborns)    |
| <b>Main ethical failure</b>            | Post-creation abandonment                 | Concealment and loss of control               | Evading institutional oversight                       |
| <b>When responsibility is taken</b>    | Never fully acknowledged                  | Only afterwards, in a written confession      | Only acknowledged in court                            |
| <b>Present-day bioethical parallel</b> | Responsibility for GMOs, gene editing, AI | Self-experimentation, precautionary principle | Germline editing, ethics committees, informed consent |

## Notes for the teacher

- Suggested timing: 6-8 hours in total (2h Frankenstein, 2h Jekyll/Hyde, 1-2h He Jiankui case, 1-2h summary activity).
- Quotations from both novels are in the public domain (1818 and 1886) and may be reproduced, extended, or replaced with other extracts at the teacher's discretion.
- All written and spoken production is intended to be carried out in English, consistent with the aims of a Technical English course; the teacher may pre-teach the key vocabulary lists before each section.
- Possible cross-curricular links: Law (regulation of clinical trials and ethics committees), History (eugenics, unethical 20th-century experiments such as Tuskegee), Citizenship (social stigma linked to genetic conditions).