Fictions, fantasies, and fears

The literary foundations of the cloning debate

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Abstract

The debate about cloning and genetic engineering, which began in 1997, has been strongly influenced by fictional narratives, scripts, and images. They in turn provided the seeds for the creation of various metaphors used in the debate, especially by the media. The flow of metaphors and images associated with cloning is now ebbing away and is being replaced by a new wave of images and metaphors deployed in arguments against genetically modified food. In both cases, cloning and genetically modified food, the media reports are interwoven with more or less explicit references to science fiction novels and films,
from *Frankenstein* to *Gattaca* and beyond. They nourish and reflect the general public's fears about an increasing process of biological hybridisation which blurs the boundaries between humans, plants, animals and machines and threatens people's sense of humanity.

1. Introduction

Every time a new and unknown disease, plague or epidemic sweeps through a population, one can observe a surge in metaphorical activity. This could be demonstrated by looking at the (literary, journalistic, discursive) reactions to the Black Death in the past or to Aids in the present (see Sonntag 1989). After this surge in metaphorical activity a process of normalisation sets in, sometimes even a reaction against any overly metaphorical and hyperbolic talk. People start arguing that Aids 'is just a virus', and so on (see Strong 1990).

In the more immediate past, it was possible to observe such a surge in metaphorical activity, followed by a process of normalisation. This time people did not have to deal with an unknown disease, but with an unexpected scientific advance which could have immense consequences for the treatment of diseases and genetic abnormalities, namely cloning.

In this article we shall explore the surge in imaginary and metaphorical activity which occurred immediately after the issue of cloning was put on the public agenda. The flow of metaphors is now ebbing away, and, just as in the case of Aids, one can see a process of normalisation setting in. The media have started to argue that cloning is just another way of having babies or just another way of helping to cure sick children (*The Times*, 9/10/99, p. 12; see Woodman 1999), and that human clones would be just delayed twins or just loveable babies (*Panorama*, 1999; see also Hodgson 1998: 45). A publisher of children's books has even brought out a little hands-on guide to the issue of cloning entitled *How to Clone aSheep* (Richardson 1999).

Cloning was put on the public agenda when, in the spring of 1997, the Roslin Institute in Scotland, under the leadership of Dr Ian Wilmut, announced the successful creation of Dolly the sheep, the first cloned adult mammal.

Since then the public debate in Great Britain and the USA[i] of the rapidly moving field of genetic research has been influenced by media reports and discussions on the internet.[ii] In order to understand the initially negative, emotional reactions towards cloning by part of the media and the public, we shall explore the ways in which they draw on, rearticulate and resonate with images from popular science fiction literature and film, especially dystopian science fiction (see also Nerlich, Clarke and Dingwall 1999; Nerlich, Clarke and Dingwall, in press).[iii]

The main questions this article tries to answer are: How do *fictional narratives* provide the grounding for various types of discourses about cloning and genetic engineering? And how do they suggest metaphors, scripts and frameworks that can be used to argue about this scientific advance?

After the advent of Dolly the cloned sheep in February 1997, the most heated ethical, political, and medical debate took place around the topic: Should we produce human clones? On the one hand, this was astonishing, as most of the serious researchers involved in cloning animals had stressed that they did not intend to clone humans. On the other hand, this was predictable, even inescapable, as the possibility of human clones had been discussed widely in

science fiction since at least the beginning of the 19th century, when Mary Shelley published *Frankenstein; or, the modern Prometheus* (Shelley [1832]1971).

Scientists and policy makers have tried to enhance the image of genetic engineering by splitting the discourse about cloning up into talk about therapeutic cloning (cloning for the sake of better medicine and health care, production of spare body parts, etc.), which is portrayed as a positive development, and talk about reproductive cloning (cloning of whole human beings, production of offspring, etc.), which is mostly portrayed as still being a long way off, if not completely out of the question. But public scepticism remains high and has spilled over into the debate about genetically modified food, so called 'Frankenstein food'.

Since the very beginning of the debate surrounding genetic engineering, be it of humans, as in the case of clones, or plants, as in the case of genetically modified food, Frankenstein has always been the imaginary hook onto which chains of arguments about these issues were attached. In the following we shall try to show how Frankenstein has lived on in various incarnations in the science fiction novels and films produced during the 20th century and how, during that century, the fictional representations of our biological future have merged with scientific facts, how fiction has become flesh. We shall then be a step closer to answering some fundamental question, such as: How have these fictional and factual mergers between humans, animals, plants and machines shaped our visions of what human identity is, of what a person is, of what makes humans human? And in what way have these facts and fictions fanned our anxieties as to where the boundaries are that separate humans from animals, plants, and machines, a blurring of boundaries that once was just fantasy but is now becoming fact?

2. Science and science fiction: themes, scripts, and metaphors for cloning

The current discourse on cloning is based on a wide network of metaphors and commonplaces (see Nerlich, Clarke and Dingwall, in press). Access to this network is usually provided by vivid images linked directly to certain science fiction media (see Wellcome Report 1998). Although only a handful of literary and cinematic references (such as, *Frankenstein, Brave New World, The Stepford Wives, Boys from Brazil, Multiplicity,* and *Gattaca*) are used consistently, it has been very easy to make the imaginary leap that links cloning science to cloning fiction, as throughout the 20th century genetic science and genetic fiction have constantly intermeshed. This will be demonstrated in this section, where we explore the gradual emergence of various themes, scripts, images and metaphors on which the modern discourse of cloning could feed. As one journalist has pointed out at the height of the metaphorical activity, following the announcement of the creation of Dolly the sheep:

> Its [sci-fi's] task, from *Frankenstein* onwards, has been to respond to possibilities, to the hopes and fears, the dangers and delights of the future. Science fiction writers grapple with and form our philosophical futures as much as our scientific ones. (Campbell-Johnston 1998: 19)

We shall provide an overview of the scientific advances made during this century in the science of cloning[iv] and some of the parallel developments made in the science fiction of cloning,[v] where writers were quite often unable to keep up with the real advances in science.

It all began when Mary Shelley published her bestseller *Frankenstein* . The myth of Frankenstein became the most fundamental imaginary and metaphorical background for any talk about cloning, genetic engineering and genetically modified food. The image of Frankenstein's monster was quickly showing through the picture of Dolly the sheep. And all the assurances by Dolly's creators that they would not like to engage in the cloning of humans did little to dispel this powerful image of a human monster lurking behind Dolly. This human monster soon turned into lots of human monsters. Images of armies of human clones (dictators and super-warriors, in particular) proliferated. Very soon Frankenstein's monster merged with the assembly lines of *Brave New World*, another futuristic reference point that was transformed by this confrontation with reality. *Frankenstein* evoked the script of the mad scientist who invents an individual human monster, whereas *Brave New World* evoked the script of the state-managed production of clones on assembly lines, a script that is directly linked to that of the mad dictator who wants to create an army of followers or a master-race (see Turney 1998). All this links back to social and literary events dispersed throughout the 20th century.

2.1 Science and science fiction in the 20th century: An overview

During the 1930s and 1940s the Nazis tried to create a super-race through 'eugenics'. Here social engineering does the work of genetic engineering. However, Hans Spemann performs the first nuclear transfer experiment (the basis of modern cloning) in 1928 and in 1932 he proposes a "fantastical experiment" of cloning higher organisms (see footnote 4). Genetic engineering (in the widest sense) makes a first appearance in a novel published more or less at the same time: Aldous Huxley's 1932 *Brave New World*. Here we find a portrayal of developing embryos in vitro, in 'test-tubes'. In 1945 Alfred Elton Van Vogt writes about the duplication of one's self in a biological fashion in the book *The World of A* (Van Vogt 1945). At that time two important themes emerge in the literature which were to be used over and over again in modern cloning discourse: that of the armies of identical monsters and that of the search for immortality.

In 1952 a tadpole makes history as the first cloned animal. Using cells from a tadpole embryo, Robert Briggs and Thomas King (Philadelphia) create new tadpoles identical to the original donor. They create them from foetal cells, but fail to do so with adult cells. In 1953 Crick and Watson discover the structure of DNA. At the same time Jack Vance publishes the book *To Live Forever* (Vance 1956), which addresses some of the ethical questions which, as early as 1956, are raised by the cloning of the rich and powerful. The immortality theme continues and the new theme of the cloning of rich and powerful people emerges.

During the 1960s John Gurdon, a British biologist, produces the first clones of animals from the skin cells of frogs, but the tadpoles do not develop into adults and no one is able to reproduce the work in higher mammals. In 1963 the term 'clone' is coined by J. B. S. Haldane. At the same time books and films continue to explore the topic of copying human beings. The film *The Village of the Damned* is released in 1960, based on the 1951 novel *The Midwich Cuckoos* by John Wyndham (Wyndham 1951) (a new film version appeared in 1995): One day, everyone in the village is rendered unconscious by a mysterious gas. Nine months later, all of the town's young women give birth to blond (Hitler-youth-type) babies. The babies develop strange powers and control the people around them. The parents become afraid of the children and strange accidents start to happen... The myth of the alien or higher mental powers of clones emerges. In 1962 Theodore Sturgeon publishes the book *When You*

Care, When You Love, where a rich woman tries to clone her dead lover. The theme of the cloning of loved ones emerges.[vi] At the same time the theme of cloning in general is amalgamated with science fiction's classical discourse about alien invaders in the 1965 B-movie *The Human Duplicators*. The term 'duplicator' would be widely used in the 1990s discourse about cloning.

During the 1970s the science and especially the science fiction of cloning accelerate. In 1972 scientists succeed in cloning a gene. In 1978 Karl Illmensee, a scientist at the University of Geneva, claims to have cloned mice, but the research is disputed. The same year Baby Louise Brown is born, the first child conceived through in-vitro fertilisation. The debate about IVF provides future arguments in the discourses for and against cloning, e.g., the argument that clones are just twins, the argument against scientists 'playing God', and so on. It is therefore not astonishing that science fiction literature develops many cloning themes during the 1970s.

In 1973 Richard Cowper publishes his book *Clone* (Cowper 1973), followed in 1976 by Kate Wilhelm's *Where Late the Sweet Birds Sang* (Wilhelm 1976). They "suggest that the members of a clone might enjoy a supernatural *rapport*, embracing a common cause automatically" and developing something like a collective consciousness (see Nicholls 1983: 150). This theme was not taken up in the 1990s, but other themes were. In 1972 Gene Wolfe writes his novel *The Fifth Head of Cerberus* (Wolfe 1972) in which he explores the problem of a clone only having a father and not a mother and hating him and so 'himself'. This problem would also be discussed after the advent of Dolly in 1997. More importantly science fiction continues to explore the topic of reproducing famous people in the 1973 novel *Joshua, Son of None*, by Nancy Freedman, in which John F. Kennedy is cloned (Freedman 1973). In 1975 the film *The Stepford Wives* is released, where an ex-Disneyland employee is making robot replicas of the women for the husbands of Stepford. The myth of the clone merges with that of the robot. In 1978 the film *Boys from Brazil*, based on yet another Ira Levin novel (Levin [1976] 1995), is first shown, depicting the cloning of Adolf Hitler in the jungles of South America by fanatical ex-Nazis, in their evil quest for a pure race. Together with *Brave New World*, this film is quoted in almost every cloning debate during the 1990s. The same year another film, *The Darker Side of Terror* explores cloning, but is based on a fundamental misunderstanding of this issue. It exhibits one of the constants of the older and the modern cloning debate, namely that cloned adults are grown in a matter of months or even instantly and can stand beside the original like a living photocopy. Between science and science fiction lies David Rorvik's book *In his Image: The Cloning of a Man*, published in 1978, in which he claims to have observed the successful cloning of a millionaire (Rorvik 1978). The book was declared a hoax in 1981.

In 1986 Steed Willadsen, a brilliant Danish scientist, publishes research proving that it is possible to clone sheep from early embryos. Willadsen and Ian Wilmut (the future 'father' of Dolly) have a conversation in a bar. Willadsen later leaves the field, but Wilmut continues his research. In 1987 the first mammals, sheep and cows, are cloned from embryonic cells. But animals cloned from embryonic cells contain the genetic material of both parents because the embryos are sexually fertilised. Clones from embryonic cells from the same parents fertilised at different times are as different as brothers and sisters.

Again science fiction stories abound in the 1980s. In 1982 the film *Blade Runner* is released. This is a detective story with a dysphoric outlook for civilisation. In the year 2019 humanity has expanded far beyond the Earth. There are also artificial humans, so called replicants, who are used in the most hazardous of environments. In their latest incarnation

these replicants have surpassed their makers. The term ‘replicant’, just like that of ‘duplicator’, resurfaced in the 1990s. In 1988 C. J. Cherryh publishes the trilogy*Cyteen* (Cherryh 1988). Here a powerful member of a scientific establishment has died and part of her work suggests that it might be possible to clone a human and raise the clone in such a way that it could take up where the original left off. A year later, Fay Weldon, who would later interview Ian Wilmut for the BBC, publishes the book, *The Cloning of Joanna May* (Weldon 1989). This is a post-Chernobyl story about genetic experiments. The scientist Carl has created four clones from one of his ex-wife Joanna May’s eggs: Jane, Julie, Gina, and Alice. They grow up, meet and want revenge.

In 1993 scientists at George Washington University perform the first artificial twinning using human embryos. The same year Dino-clones appear in Steven Spielberg’s film *Jurassic Park*, a subject that has fascinated the public ever since. Speculations about the possibility of resurrecting extinct species, such as the mammoth, through cloning have been rife ever since the cloning of Dolly the sheep. In 1993 David Brin publishes the book *The Glory Season*: On planet Stratos women are dominant politically, numerically, and sexually; the most successful women clone themselves to create aristocratic families. And again in 1993 clones appear on television in the highly popular series *The X-Files*. FBI agents are assigned to a mysterious case in which identical girls on opposite coasts each discover a dead parent. It turns out that the girls are clones. In 1993 the first popular science book appears that assesses the impact of cloning on society: Andrew Kimbrell’s *The Human Body Shop* (Kimbrell 1993). The book shows how the human body has become a commodity -- blood, organs, and foetal tissue are bought and sold, fertility is merchandised, and human cloning is poised as the final step on this slippery ethical path. This provides scenarios for the important discourse about the cloning of ‘spare parts’ in the contemporary cloning debate. Reality catches up with the spare-part discourse when, in 1995 scientists succeed in growing a human ear on a mouse, a first success in tissue engineering. The image of the mouse with the human ear became a pre-Dolly icon in the cloning debate.

In 1996 Ian Wilmut and colleagues at the Roslin Institute in Edinburgh clone two sheep, Morag and Megan, using the technique of nuclear transfer, but only using early embryo cells. Ken Follett publishes the book *The Third Twin* (Follett 1996), a thriller that only tangentially deals with the science of cloning. Two films are released: *Twelve Monkeys* and *Multiplicity*. The first one deals with genetic engineering in a futuristic scenario, the second is a harmless comedy that skips over any scientific detail. A contractor is unable to juggle the demands of his busy life and a mad scientist creates a few extra versions of him. Here cloning becomes fun, but *Multiplicity* is also quoted in discourse opposed to cloning.

All these sci-fi stories form the backdrop when, on 23 February, 1997, *The Observer* breaks the story of Dolly the sheep, and when, on 27 February 1997, Wilmut et al. publish an article in *Nature* about the first adult clone of an animal generated by transferring the nucleus of an udder cell taken from a six-year-old sheep into an unfertilised egg cell which had his own nucleus removed (Wilmut et al. 1997). Now science fiction meets reality head on. They almost merge when one week after Dolly the creation of*CloneAid* is announced on the internet, a company founded by a religious cult (the Raelians, who believe that mankind resulted from the cloning of aliens), and when in January 1998 Richard Seed announces that he wants to set up human cloning clinics with the help of this foundation. The phrase ‘playing God’ becomes central to anti-cloning discourse.

In 1997 three films explore the implication of human cloning: *Gattaca*, *Alien Resurrection,* and *The Day after Roswell*.

Gattaca relies on less than subtle imagery (the staircase which the paraplegic Jude Law must struggle to ascend is sculpted in the likeness of a DNA molecule) and paints a vision of a dystopian future in which prospective parents can obtain genetic profiles of their*in vitro* embryos and, based on that information decide which to implant. In effect, they will be able to choose -- to some extent -- the kind of children they will have (Gavaghan 1998/9: 18).

Gattaca instantly becomes a frame for the discourse on cloning and the 'manufacturing of children'. The film *Alien Resurrection* is a follow-up to *Alien 3*: 200 years after the events from *Alien 3*, a new corporation resurrects Ellen Ripley from a blood sample and removes from her the Queen Alien embryo implanted inside her. This clone finds that her DNA has been mixed with the Alien DNA, giving her heightened abilities, and a frightening question about how human she is. The film *The Day after Roswell* also merges cloning with aliens: Extraterrestrials in the form of genetically altered, cloned, humanoid automatons, are harvesting biological specimens on Earth for their own experimentation. Nightmare scenarios thus still abound in sci-fi stories even after the appearance of the cuddly sheep called Dolly.

On 19 October 1998, Jonathan Slack, a British biologist at Bath University is reported to have created clones of headless frog embryos, another evil image that people add to their catalogue of evil cloning images, and which stimulates their opposition to therapeutic or spare-part cloning. In July 1998 Danielle Steel publishes the book *The Klone and I* (Steel 1998), about a woman who gets divorced and then falls in love with somebody who is a clone. However, the clone portrayed in this book is part robot, part bionic human being, a portrayal of a clone which shows how slow (sci-fi) writing can be in catching up with reality. It also shows how the image of the instant appearance of a grown-up copy of an adult still pervades popular thinking about cloning, whereas a 'real' clone would first appear as a baby and then grow up in the normal way.

In 1999 Lynne Truss publishes her book *Going Loco*, where the science and literature of cloning merge. Here we have the heroine, Belinda, on the one hand, an expert in 'doubles in literature', and her husband on the other hand, who is a cloning geneticist. Furthermore, her best friend, a Shakespearean actress, is confronted by two identical brothers, both of whom she makes the mistake of sleeping with. As Lynn Truss confesses herself (Truss 1999: 37), putting the real 'science of cloning' into the novel was not as easy as she thought. It is much easier to stay with clichés and frameworks handed down by generations of sci-fi writers since Mary Shelley, clichés which are now joined by Dolly the sheep, the often quoted but rarely understood clone of all clones.

2.2 Fictions, fantasies and metaphors in the cloning debate

The power that these themes, scripts, and images had over peoples imagination and over the imagined consequences of human cloning, has recently been demonstrated by research with focus groups undertaken by the *Wellcome Trust* (Wellcome Report 1998). Researchers found that the titles of books and films were used by subjects as references "in a metaphorical manner to which it was hoped others within the group would relate" (Wellcome Report 1998, 6.2).

Discussions were peppered throughout with negative references to films and books including *The Boys from Brazil*, *Jurassic Park*, *Blade Runner*, *Invasion of the Bodysnatchers*, *Frankenstein*, *Brave New World*, *Stepford Wives*, *Star Trek* and *Alien Resurrection*. These references were often used to punctuate discussion, but it was not always clear which aspects of the film were being alluded to. Classic stories such as *Frankenstein*, *Brave New World* and, to a lesser extent, *The Boys from Brazil*, were not referred to in detail, but were often simply cited as examples. Just the reference to a film or book appeared to be sufficient to describe participant's concerns, and there was an assumption that others in the group would be able to understand these instantly. Several participants mentioned having seen the film GATTACA, which was on general release over the research period, but in cases where there was less familiarity they took more time to explain the general plot to others in the group. (Wellcome Report 1998)

As *The Times* (26/2/97) wrote immediately after the birth of Dolly, cloning is a "topic deeply distorted in the popular understanding by the lurid nightmares of science fiction." And *The Independent* (8/11/98) still wrote over a year later: "Human embryology raises huge ethical concerns in its own right [...], but when it also involves cloning, the anxiety is even greater. The fears have been well exercised in works of fiction, from Aldous Huxley's vision of a cloned race of sub-intelligent workers to the nightmare scenario of the 1970s film *Boys from Brazil*, where clones of Hitler are raised secretly in the South American jungle."

These fears were echoed by the general public when they spoke about cloning at the end of 1998. A woman who lost a child said: "You see it on films, armies of marching robots. Why do we need cloning?"; a grandparent wrote in a diary: "I dread to think what could happen if it was to end up like something of a sci-fi film"; a man said: "Cloning ... I mean it's Frankenstein-type medicine"; a woman in her 30s/40s said: "It's a Star Trek thing - androids with a brain that could think like a human"; and another man summarised the feeling of many when he said: "I have a Brave New World vision where we have half a dozen or so different kinds of human being classified according to their ability ... I think Mr Huxley was quite perceptive" (Wellcome Report 1998). *The Times*report about the Wellcome inquiry quotes a woman as saying "she could visualise a spare parts cloning plant 'I can just imagine this factory with all these little hearts pumping away in jars'." (*The Times*, 4/12/98, p. 12)

These images were the foundations for the development of some fundamental metaphors, according to which CLONES ARE COPIES that have inferior value, CLONES ARE PLANTS/ANIMALS that can be farmed and harvested, CLONES ARE PRODUCTS, CLONES ARE MACHINES, BODY PARTS OF CLONES ARE SPARE PARTS that can be bought and sold, exchanged for better ones, and so on (see Nerlich, Clarke and Dingwall 1999). Public discourse based on these metaphorical foundations could only see clones in a negative light. The popular press began to reject the possible creation of 'robotic' slaves, of armies of mad dictators, and so on, and began to condemn the hybris of some, especially the rich and famous, who might use cloning as a means to achieve immortality for themselves or their loved ones, or to have designer babies.

Nowadays, the spotlight of public concern has shifted from clones to genetically modified food. Therapeutic cloning, or cloning for medicine has almost become acceptable. This shift in public perception may have been made possible by a gradual habituation to the image of Dolly, the cloned sheep, an image that we shall explore next.

3. Dolly: Dream come true or devil incarnate?

Since 1997 Dolly the cloned sheep has become the symbolic focus for a network of arguments ranging from animal and human cloning to assisted reproduction and genetic engineering. 'Dolly' has become the battleground on which these arguments are fought out. She has become a cultural icon, and an icon of biological control. "The point is that [up to Dolly] the new genetics has lacked a truly emotive symbol, a *spectacle*." (Hodgson 1998: 71)

Dolly has also become the centre in a polarisation of arguments with popular nightmares of cloning on one end of the scale (the creation of a super race or a race of slaves, the cloning of Hitler, the multiplication of selfish people) and expert dreams of the potential benefits on the other (the genetic modification of livestock, transgenetic animals who provide human proteins, the possibilities for treatment of cystic fibrosis, haemophilia, infertility, therapeutic cloning, tissue engineering). Dolly has become a material symbol of our power over the genetic world, a power for good or evil which otherwise would be too abstract to grasp, understand and talk about. In the same way cloning itself has become a metaphor for the wonders and horrors of the genetic revolution itself.

In the following we shall explore the positive and negative images, feelings, and fantasies evoked by Dolly the sheep.

Figure 1

3. 1 Dolly, the nightmare

The *Observer* (23/2/97) story which enabled journalists world-wide to break the *Nature* embargo contained the front page headline, "Scientists clone adult sheep: Triumph for UK raises alarm over human use". It was accompanied by a photograph of a sheep's head held by the neck and looking slightly demonic... (see Hodgson 1998: 30). This means that from the start fears were aroused about the possibility of human clones walking this earth, fears associated with the fear of Frankenstein's monster. As Lisa Jardine wrote in her recent book on the history of science:

> Dolly the cloned sheep was not heralded as a glorious piece of innovative science. Aghast, the newspapers of the world responded to this sensational scientific advance with a clamour of moral outrage. Driven blindly by the search for the new, we were told, the Scottish scientists were careering toward disaster along that sinister path to damnation notoriously embarked upon by the demonic hero of Mary Shelley's famous novel, Dr Frankenstein. In no time at all we would face the nightmare scenario of genetically engineered armies of identical soldiers, bred to exterminate with ruthless efficiency. Parents would shortly decide exactly what mental and physical characteristics they wanted for their offspring and order them tailor-made, off the shelf. (Jardine 1999: 1-2)

Soon however, this demonic picture of Dolly was superseded by a sweeter picture of Dolly the great healer and Dolly the superstar.

3. 2 Dolly, the medical advance

When portraying Dolly as a medical advance (sometimes comparing the cloning of Dolly with setting foot on the moon for the first time) scientists are at pains to make sure that the picture of the human clone (Frankenstein's monster) is not superimposed on Dolly the sheep and to make sure that she is just ewe, just a sheep, in fact just a by-product of more fundamental research into biological development -- as Ian Wilmut said, just "the extra cheese on the pizza".

When interviewed, one of Wilmut's main aims is obviously to contain fears. He says at one point that the "image of the monsters is not going to happen" (Hodgson 1998: 30).

As Ian Wilmut will tell anyone who cares to listen, the main aim of his team at the Roslin Institute in Scotland was to transform the genetic engineering of farm animals (sheep first, then cows) from a hit-and-miss experimental procedure into a robust technology. Cloning was just a welcome by-product; Dolly, the extra cheese on the pizza. (*New Scientist Plant Science*, online)

3.3 Dolly, the holy grail of science

For some, the creation of Dolly was like touching the holy grail of science or like finding the biological equivalent of the philosopher's stone (*The Observer*, 9/5/99, p. 23). Creating Dolly was not so much a step into the direction of human cloning but a stepping stone towards opening up whole new avenues of medical research and medical intervention. Cloning was not so much seen as a way of creating new life, but one way of preserving and prolonging existing life. This view of Dolly is obviously linked to seeing Dolly 'just' as a medical advance, just as a ewe, albeit a special one.

3.5 Dolly, the superstar

Despite the public's fears and the scientists' efforts to keep things in perspective, Dolly soon became the most photographed sheep of all time and the *Science Museum* in London proposed to stuff her after her death. The *Daily Mail* (7/6/97) reported that "artists want to paint her. School children want to cuddle her. A U.S. prime time chat show has even offered big bucks to fly her over for interview." Andy Coghlan reported in *The New Scientist* (19/9/98):

Dolly is firmly lodged in the public consciousness. A survey of 1018 Britons has revealed that more than half had heard of her. Of those, 65 per cent knew she was the first mammal cloned from an adult cell.

[...] despite the Roslin researchers' assurances that they don't want their technology applied to people, 49 per cent of the respondents familiar with Dolly believed that she was made to advance human cloning. (Coghlan 1998, online)

3.6 Dolly, the cuddly sheep

The photos we see of Dolly the sheep are in fact anything but evil. Like its creator, Ian Wilmut, Dolly, does not conjure up Frankensteinian imagery. On the contrary:

Crucially, Dolly has become a comforting, hyper-familiar symbol of the new genetics offsetting against overt disgust. She is cuddly and slightly comical, perceived to be docile and timid, in need of protection. Sheep are very much favoured representations of the pastoral and tranquillity. But definitely not evocative of monstrosity or immediate threat. (Hodgson 1998: 72)

It is important to note that Dolly has a name, something that other human monsters, such as Frankenstein's monster, lack. The name was chosen by Ian Wilmut because the cells used in the nuclear transfer had been taken from mammary tissue, and he was reminded of Dolly Parton (Kolata 1997). Dolly Parton herself is said to have felt flattered by the fact that her name was thus used. The name 'Dolly' has still other positive connotations: it evokes images of a toy doll, of sweets called 'Dolly mixture' (Hadfield and Coghlan 1998, online), and it calls up the tune "Hello, Dolly", a reference made many times after the birth of Dolly. And finally, Dolly the sheep also conjures up the image of the 'lamb of God'.

3.7 Dolly the ambiguous sheep

Within Judaeo-Christian mythology the sheep (or lamb) was a symbol of innocence and purity, indeed the bible talks of the 'blood of the lamb' as a metaphor for Christ. God is depicted as the shepherd (Hodgson 1998: 74). The *Daily Mail* (24/2/97) used the phrase: "faced not with the Lamb of God but with the Lamb of man" and *The Independent* (1/3/97) quoted from William Blake: "Little lamb, whom made thee?" Here the sweet image of the lamb of God is transformed into the more evil image of the man-made monster, made by scientists who are playing God.

3.8 Dolly, letting the genie out of the bottle and opening Pandora's box

The fears about what genetic engineering might mean for humanity found expressions in some more negative phraseology associated with Dolly's appearance.

Together with the phrase saying that doing research into cloning is like 'opening Pandora's Box', the phrase 'letting the genie out of the bottle' is frequently used to consider the consequences of succeeding in cloning a mammal (see Anderson, 1997, online). The fears are that once research into cloning is successful, people will want to clone humans at any cost, and that some mavericks, like Richard Seed, will do so in a scientific and ethical vacuum. Commercial interests (and the demand of infertile couples) will become an overriding factor. A similar fear is expressed by the phrase that Dolly might be "a wolf in sheep's clothing", and by comparisons between Dolly and the invention of the atomic bomb.

Thus the image of Dolly was either used to subvert some of the very negative images of cloning and to allay some of the fears about the genetic revolution in general, or it was seen as an indicator that human cloning is imminent and must be stopped. The discourse about cloning thus wavered for a long time between horror and hope, before finally being overtaken by another discourse, that about genetically modified food and the horrors and hopes this scientific advance evokes.

4. Conclusion

We have seen in the previous sections that the science of cloning and the negative portrayal of cloning in science fiction have constantly intermeshed during the 20th century, to such an extent that when cloning became a scientific reality this reality was predominantly seen as a nightmare, and this despite the cuddly image that Dolly the sheep managed to convey and which gradually habituated the public to seeing cloning in a slightly more positive light.

On the main, clones could only be envisaged as alien, monstrous creatures, as Polaroid copies of evil adults. It was difficult to see them 'just as babies' that would grow up in the normal way and that would grow up in a different cultural and social environment from the 'parent'. Despite some dissident voices, who pointed out that Hitler's biological clone would not necessarily be a behavioural clone because the environmental influences would be utterly different, most stories drifted towards a crass genetic determinism.

As the spotlight of genetic engineering has gradually shifted from clones to genetically modified foods and crops, the fears about cloning have been backgrounded and the public imagination has latched onto *Frankenfood*, *Frankenfish*, and even*Frankencells*. As one wave of images and metaphors ebbs away, another begins. And as in the case of cloning: "We have invested genetically modified food with images of cheap science-fiction horror that bear no relation to the science that is in fact involved" (*The Independent*, 5/6/99).

We do not hear much about clones as resurrected dead, as bizarre hybrids and monsters, as superwarriors, or armies of Übermenschen any longer, instead we read about mutant plants, alien genes, killer tomatoes, devilish seeds, and suicidal potatoes (see Nerlich, Clarke, and Dingwall, in press). And where once the media and the public conceived clones as plants that can be farmed and harvested, we now conceive plants as humans that kill.

This conceptualisation of humans as plants (or animals, or machines) and the conceptualisation of plants as humans might not only be a superficial symptom of how people conceive one thing in terms of another, but might be a symbol for an underlying public fear about the breakdown of traditional boundaries: between humans and plants, between humans and machines, between humans and animals, and between the human body and the environment. Feeding on sci-fi themes and metaphors, the public may fear that a process of (monstrous) hybridisation is setting in (a process which goes well beyond the ordinary metaphorical mapping and blending), which blurs traditional boundaries and threatens not only our perception of what humanity is but of what personal identity and personal dignity are. In this context the use of metaphor is neither purely poetic nor purely cognitive, but it provides a framework for the expression of social concerns. As Gergen wrote:

In certain historical periods metaphors serve to express commonly held but imperfectly articulated feelings. People often share certain sentiments, fears, or hopes that have failed to reach expression for lack of adequate means. At such times a well-chosen metaphor may be taken up quite eagerly. Such popular metaphors serve as a medium of common understanding, giving people a sense of communality and possible direction. (Gergen 1990: 275)

Public fears about genetically modified foods, expressed in imaginative blends and metaphors, such as *Frankenfood*, have had a direct influence on the production and consumption of GM products. In a recent development "a global agreement has been reached on safety rules for genetically modified products that allows countries to bar those seen as a threat" (*The Times*, 31/01/2000, p. 8). Dystopian views of genetic engineering, and the themes, scripts and metaphors related with it, have therefore changed how we live in the present and how we shape our future.

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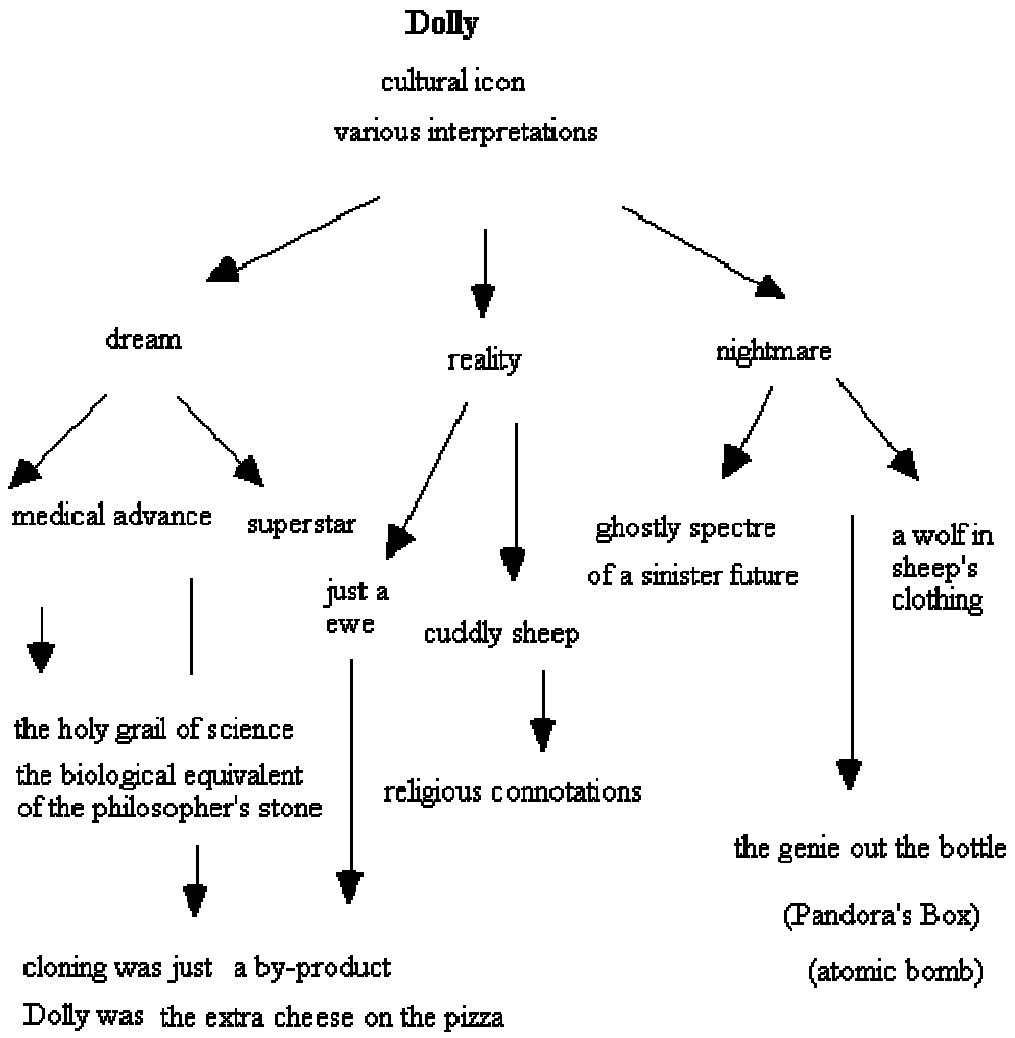
Figure 1: The various faces of Dolly the sheep



Notes

[i]For reasons of space and time this research has been restricted to the English speaking world. Comparative studies focusing on the discourse about cloning in other languages would naturally be very welcome.

[ii]We analysed 50 articles which were published in *The Times*, *The Sunday Times*, *The Observer*, *The Times Higher Education Supplement*, *The Guardian*, *The Independent*, *The Independent on Sunday*, *The Daily Mail*, *The Radio Times*, and two online magazines, *Reason Magazine*, and *Salon Magazine*. We also studied 14 web-sites on cloning (the biggest of which were the web-sites maintained by the *New Scientist*, *Nature*, *Scientific American*, the Roslin Institute, and *Yahoo*, 16 web essays and news releases (US), and 3 US discussion forums (one bioethical, one theological, one general).

[iii]It should be stressed that the negative reaction to genetic engineering and genetic modification of food is qualitatively different in Britain compared to the US or mainland Europe, as the general public had lived for years with the BSE scare and had become very sceptical about what 'science' and what officials said about science. The fears about mad cow disease spilled over into the genetic engineering debate and made it much easier for negativism to take hold.

[iv]See the cloning time-line on: http://library.thinkquest.org/24355/data/details/timeline2.html.

[v]It should be stressed that fictional portrayals of cloning have proliferated in the last few years, and that we can only expose the tip of the literary iceberg in this article.

[vi]See *New Scientist*, *Planet Science*: http://www.nsplus.com/nsplus/insight/clone/clonelinks.html.