

Unnatural: The Heretical Act of Making People

Philip Ball

[A talk based on my 2011 book of the same title,
and in which you can find references for the quotes herein.]

I'm not going to beat around the bush; let me get straight down to it and tell you how to make a human being.

Now, I suspect you probably know one way to do that already. And many of you may have discovered that sometimes it works very well.

But I doubt whether many of you will have tried the method that I'm going to describe to you now. It appears in a book of about 1537 called *De natura rerum* (*On the Nature of Things*), written by the Swiss-German physician Paracelsus, or perhaps by one of his followers. Let me just explain a couple of technical terms first: a cucurbite is a round glass vessel, and *venter equinus* is horse dung.

Let the semen of a man putrefy by itself in a sealed cucurbite with the highest putrefaction of the *venter equinus* for forty days, or until it begins at last to live, move, and be agitated, which can easily be seen. After this time it will be in some degree like a human being, but, nevertheless, transparent and without body. If now, after this, it be every day nourished and fed cautiously and prudently with the arcanum of human blood, and kept for forty weeks in the perpetual and equal heat of a *venter equinus*, it becomes, thenceforth, a true and living infant, having all the members of a child that is born from a woman, but much smaller. This we call a homunculus; and it should be afterwards educated with the greatest care and zeal, until it grows up and begins to display intelligence. Now, this is one of the greatest secrets which God has revealed to mortal and fallible man. It is a miracle and marvel of God, an arcanum above all arcana, and deserves to be kept secret until the last times, when there shall be nothing hidden, but all things shall be made manifest.

Well OK, so it's a method that is not going to be to everyone's taste – but it doesn't sound *that* hard, does it? This is one of the most detailed accounts now known of how to create the alchemical homunculus, something that, like the transmutation of gold, several alchemists claimed to have done. The most famous of them is fictional, namely the Faust of Goethe's retelling of the legend, or more precisely Faust's assistant Wagner, who is shown in the process of doing so here:



Now, the point is surely that this is all just so much literary invention, and based on magical mumbo-jumbo and legend from the pre-scientific age, right? Well, you might think so. But it is going to be my contention in this talk that we need to take myth, legend and magic rather seriously in this context. One reason why is the way that the most influential retelling of the Faustian tale of people-making and the retribution brought about by this dreaded act – and I’m talking, of course, about Mary Shelley’s *Frankenstein* – that this now supplies the knee-jerk journalistic shorthand for any reporting of new technologies that seem to hint at a capacity for making life, especially human life.



[Picture by Martin Rowson for *New Humanist*]

For example, a *New York Times* article on in vitro fertilization three years after Robert Edwards and Patrick Steptoe reported the first successful fertilization of a human egg in culture had the title ‘The Frankenstein myth becomes reality.’ When the British government’s provisional framework for regulating embryo research was released in late 1987, the *Today* newspaper covered it under the headline ‘Clamp on Frankenstein scientists’, while the *Sun* accompanied its report with a still from a Frankenstein movie. And if you think this is merely media silliness, consider the judgement of the American Catholic magazine *America* in the early days of IVF research:

The spirit of Frankenstein did not die with the Third Reich... To produce a human being, holding it captive like a genie in a bottle, and doom it to inevitable death is to exercise an irresponsible dominion that cannot be justified by any appeal to the common welfare of mankind or to the advancement of scientific goals.

The American academic Karyn Valerius has summed up very accurately the situation we have today; she says,

assisted reproduction continues to provoke anxiety that technological intervention in procreation might compromise the humanity of humans, and monstrosity continues to figure prominently in the mediascape inhabited by high-tech assisted reproduction... Frankenstein's monster, that icon of scientific hubris, remains an absent presence lurking behind the various public culture representations of assisted reproduction as unnatural conception with potentially hazardous results.

Now, you might choose to regard this situation as merely demonstrating the media's perpetual habit of lazy sensationalism – and not without some reason. Robert Edwards, who won last year's Nobel prize in medicine or physiology, seemed to see it that way when in 1989, at the height of the debate about research on the human embryos that IVF had suddenly made available, he complained that 'Whatever today's embryologists may do, Frankenstein or Faust or Jekyll will have foreshadowed, looming over every biological debate.'

But it is too simplistic, perhaps even dangerously so, to imagine that this is just a case of scaremongering by means of Gothic novels. When we are talking about the possibility of intervening in human procreation in some way, and perhaps in initiating it by technological means, we are entering mythical territory. And that's to say, we are broaching an idea that has been conditioned by stories and legends that probably go back beyond recorded history, and which speak to some of the most deep-seated fears, preconceptions and prejudices in the human mind. If we believe we can deal with all that baggage by complaining that Frankenstein's monster keeps raising his green and flattened head, we are deluding ourselves.

Most importantly, we would be wrong to imagine that this is simply a case of hard-headed science pitted against muddle-minded populism and ignorance. Let me give you an example of why I say that. Two years after Edwards and Steptoe published their ground-breaking paper in IVF in 1969, a conference on 'fabricating babies' was held in Washington DC. One of the eminent attendees was James Watson, the co-discoverer of DNA's structure and at that time the director of the Cold Spring Harbor Laboratory for research on genetics. What he said to Edwards, also a participant of the meeting, was this:

You can only go ahead with your work if you accept the necessity of infanticide. There are going to be a lot of mistakes. What are we going to do about the mistakes? We have to think about some things we refuse to think about.

What he had in mind was voiced more explicitly by another leading biologist at the meeting, Max Perutz, who warned how IVF might lead to, as he put it, 'a new thalidomide catastrophe.' They both seemed convinced that IVF was going to lead to the

conception and perhaps the birth of babies with severe physical abnormalities, or what would in an earlier age have been called monsters. Yet there was no evidence at all, for example from experience with animal IVF up to that point, that this was likely. And indeed it has proved to be a totally mistaken view. Why would even these leading scientists suspect that intervention in human conception would produce monstrosities?

This, at any rate, is the first of several mythical preconceptions I want to highlight about the nature of what I call anthropoeia, which means the technologies of ‘making humans’:

The ‘artificial person’ will be monstrous.

The important point here is not simply to recognize that technologies like IVF have provoked misguided fears and criticisms, but to recognize the nature and the motivation of those objections. Behind the flimsy, illogical, censorious or merely vague condemnations seem to lurk unarticulated ideas about naturalness and its violation. While it’s tempting to react with either laughter or despair at the medieval objections of one of the interviewees in a poll on assisted conception conducted in 1969 for *Life* magazine, I find something oddly admirable in the way it accesses so directly the mythical ingredients that hide beneath a veneer of learning in the remarks of some academics, both then and now. In that survey, a (quote) ‘mother of three’ in Toledo, Ohio, was reported as saying ‘I just wouldn’t feel the child was mine. It might sprout horns or wings or something.’ Angels and demons, indeed.

And in case you feel that this all sounds a bit dated today, when more than four million babies worldwide have been born by IVF, let me just remind you where popular culture currently stands with the people-making technologies of our day, which are cloning and genetic manipulation of embryos:



Alien Resurrection (1997)



Splice (2009)

Where do we start in trying to understand the origins of this kind of imagery? Well, the alchemical homunculus is not a bad place, but if we want to be more thorough then we need to go back at least to Prometheus, the Titan who challenged the Olympian gods. After all, what did Mary Shelley call Victor Frankenstein but a ‘modern Prometheus’? Now, the point about Prometheus is not just that he transgressed against the gods by giving humankind fire, and paid a terrible price. Prometheus also gave humans

technology, and with it the ability to plan for the future: his very name comes from the Greek *promathein*, which means ‘to think ahead’. And in some versions of the myth, such as those by Ovid and Aesop, Prometheus is said to have in fact created humankind himself.



Prometheus Bound (1611-12) by Peter Paul Rubens

One of the messages of that myth is therefore that technology is perilous, that it is inherently Faustian. This is a point made also in the legends of the great inventor Daedalus, who could allegedly animate statues into a semblance of life. It was Daedalus who, by enabling Minos’s wife Pasiphae to mate with a bull, instigated the creation of the half-human monster the Minotaur. And of course Daedalus too paid a bitter price for his technological brilliance, since his son was killed through one of his marvellous inventions, the wings they used to escape from Minos’s prison on Crete.



Daedalus and Icarus

Both of these mythical allusions were made by the British biologist J. B. S. Haldane in his 1924 book *Daedalus, or Science and the Future*, the first in a series of forward-

looking books published by Kegan Paul called the To-day and To-morrow series. Here Haldane said

The chemical or physical inventor is always a Prometheus. There is no great invention, from fire to flying, which has not been hailed as an insult to some god. But if every physical and chemical invention is a blasphemy, every biological invention is a perversion. There is hardly one which, on first being brought to the notice of an observer from any nation which had not previously heard of their existence, which would not appear to him as indecent and unnatural.

Here then, is my second mythical preconception about anthropoeia:

Technology is inherently perverting.

That idea can be found in the opposition to IVF that appears in the Catechism of the Catholic Church. It says this and nearly all methods of assisted conception ‘morally unacceptable’, and gives the following reasons:

They dissociate the sexual act from the procreative act. The act which brings the child into existence is no longer an act by which two persons give themselves to one another, but one that entrusts the life and identity of the embryo into the power of doctors and biologists and establishes the domination of technology over the origin and destiny of the human person.

Of course, one might object that in general, when IVF is used to address infertility, then without those ‘doctors’ and this ‘technology’ there *is* no human person, no embryo, to be ‘dominated’, no ‘origin and destiny’ to speak of. But this ‘domination of technology’ is evidently held to be bad. There seems no room here for the possibility that the doctors and the technology might be working towards the good, namely the provision of a much-wanted child. Rather, technology creates an indelible stain on the ‘origin and destiny’ of any person in whose conception it intervenes.

The same notion is clear Pope Pius XII’s judgement on artificial insemination, which can be read as a pre-emptive attack on IVF too:

To reduce the shared life of a married couple and the act of married love to a mere organic activity for transmitting semen would be like turning the domestic home, the sanctuary of the family, into a biological laboratory.

Of course artificial insemination does not really turn the home into a biological laboratory – many people have achieved it with the simplest of aids in their own homes, with not a lab-coated scientist in sight. What the pope really wants to imply here is that assisted conception makes procreation a matter of ugly biological fact – and worse than that, for there is no doubt that we are meant to regard the ‘biological laboratory’ as a sinister place in which perverse and unnatural things happen. If he had said merely that the act of married love-making had become a matter of ‘biology’, the effect would have been far weaker – we’d be inclined to respond that of course biology is involved. But the laboratory is a place of manipulation, a place where nature is traduced.

That’s a prejudice evident in the homunculus tradition, although in a more subtle way. Surprisingly, perhaps, much of the theological and philosophical unease about claims to

make homunculi centred not so much on the alleged hubris – what we now like to call ‘playing God’ – but on the status of the created being. There was a long tradition of debate, going back to Plato and Aristotle, about whether human craft and technology, or what in times past was simply called ‘art’, could generate products that were equivalent to those in nature. For Plato, art was inferior and possibly even iniquitous in its deception, whereas Aristotle implied that some art might augment and bring to completion things that nature itself could not finish. This debate was brought into focus by challenges to the alchemists’ claim to make gold – the objection was not that it wasn’t gold, but that it wasn’t as good as natural gold.

What about the homunculus, then? Again, one position was that these beings were alive but lacked the perfection of creatures produced by natural means. Some said that living organisms created by humans were infertile, which remains a common preconception – it was widely assumed, wrongly and for no reason, that Dolly the Sheep would be infertile too. More significantly, however, the homunculus was thought to lack a soul. In fact, one of the reasons why churchmen were uncomfortable with the idea was that the soulless homunculus might be considered to force God’s hand, to compel him to give it one. Or alternatively, since the homunculus was a person not descended from Adam and not possessing an immortal soul, it might be considered – heretically – to be free from original sin.

So, then, we get this next mythical preconception:

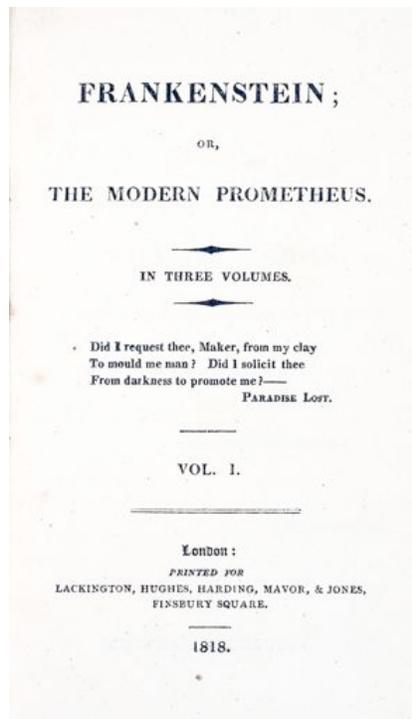
The ‘artificial person’ has no soul.

And if this seems an archaic notion, just bear in mind this note of protest left on the car of a Californian fertility doctor when he started providing an IVF service in the 1970s: ‘Test-tube babies have no souls’

The homunculus in Goethe’s *Faust* is not wholly human, and yet yearns to be. He is doomed to remain confined within his glass bottle unless he can find a way to become fully human. But he is not inferior in all respects – in some ways he occupies a higher state of being, since he possesses with magical powers. He’s presented sympathetically by Goethe as a ‘dapper charming lad’, a kind of personification of the liberated human intellect. Yet that still serves to illustrate my next proposition:

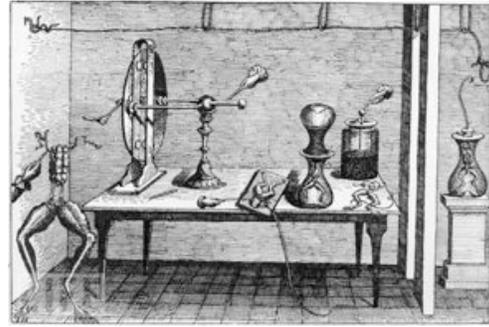
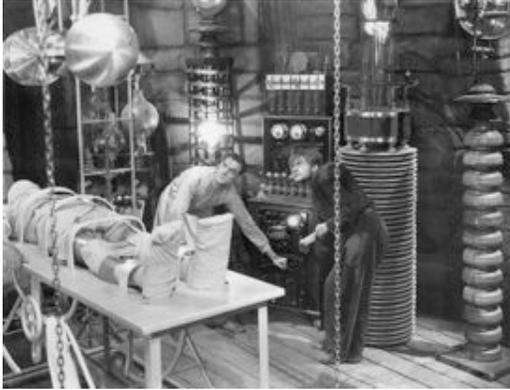
The ‘artificial person’ is not like a normal person, but either sub- or superhuman, or both.

But Goethe’s rather positive depiction of the artificial person was already eclipsed by the time he published the second part of *Faust* in 1832, the final year of his life. Because by then there was a much more resonant and famous story about anthropoeia in popular culture:



Goethe's *Faust* is explicitly based on a medieval, alchemical model of anthropoeia. But *Frankenstein* claimed to offer a modern view of this procedure. Percy Shelley wrote in his introduction to the first edition of the book in 1818 that 'the event on which this fiction is founded has been supposed by Dr Darwin and some of the physiological writers of Germany as not of impossible occurrence.' Dr Darwin here is, needless to say, not Charles, but his grandfather Erasmus, one of the leading zoologists of the late eighteenth century, who had hinted that life might be created by artificial means.

Now, Mary Shelley notoriously said very little about how Victor made his monster, and it's tempting to ridicule this image of a young student who, after reading some old alchemical books and then attending a few undergraduate lectures on chemistry, somehow discovers the secret of how to reanimate dead body parts stitched together. But in retrospect the decision to skimp on the details was wise, since there's nothing Shelley could have said about it that wouldn't seem absurdly naïve now. Although the sparks and thunderstorms are largely the invention of Hollywood, it does seem clear that Shelley wanted us to think that electricity was involved. And for good reason, because it was only shortly before she wrote the book – begun at the age of 18, remember – that the Italian physiologist Luigi Galvani had shown that he could stimulate frog's amputated limbs into a semblance of life using electrical pulses.



Electricity and reanimation

Even more dramatically, Galvani's nephew Luigi Aldini demonstrated the electrical 'reanimation' of a severed ox's head in front of the Prince of Wales and other British nobles in 1802. Even more compelling and disturbing was Aldini's experiment in 1803 in which he seemed to restore some brief semblance of life in the corpse of a criminal who had been recently hanged at Newgate Prison in London and brought swiftly to the College of Surgeons. This is how Aldini described it:

The jaw began to quiver, the adjoining muscles were horribly contorted, and the left eye actually opened... The action even of those muscles furthest distant from the points of contact with the arc was so much increased almost to give an appearance of re-animation... Vitality might, perhaps, have been restored, if many circumstances had not rendered it impossible.

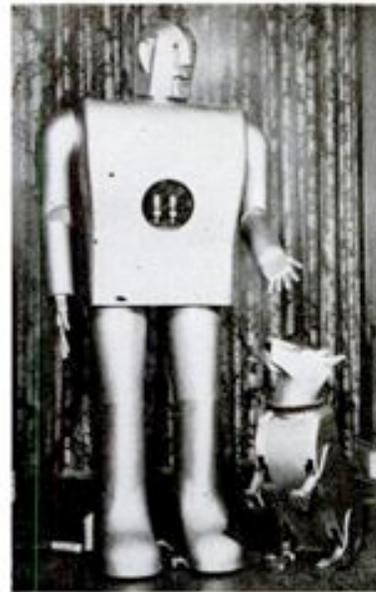
There's a great deal I could say about what *Frankenstein* did for the myth of anthropoeia but I have no time for it here. I want to make just a few points. First, this is a secular story. Despite allusions to impiety and tempting God, there are no supernatural forces at play, and the retribution brought upon Faust by the devil here is enacted by the monster itself. Second, the success of the story depended on popularization and vulgarization, and did so long before Hollywood got hold of it. The first edition of the book didn't sell especially well, but within just a few years there were sensationally popular stage productions in London, in which the storyline was already pretty much rewritten from scratch.

Third, Frankenstein's monster in these adaptations for stage and screen was not the eloquent, almost noble creature Mary Shelley described, but was made mute and child-like – an insistence that this artificial being must be seen to be deeply inferior to ourselves. In early stage versions, the creature is a grunting, wild, almost naked savage:

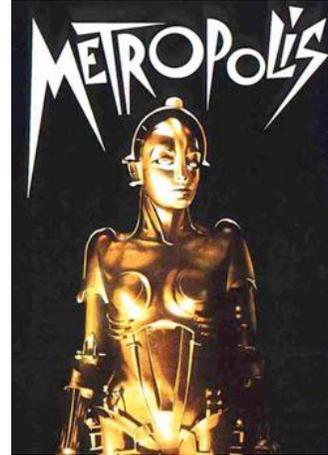


Frontispiece for Henry Milner's *Frankenstein, or The Man and the Monster* (1826)

But of course the most famous depiction was that by Boris Karloff in James Whale's seminal screen adaptation from 1931. Here, with its unnatural colour, its jerky motions, its flattened head and bolted-on neck, the monster has taken on some of the attributes of that other great symbol of the artificial person in the 20th century: the robot.



It's widely known that the word 'robot' is derived from the Czech word for 'labourer' since it first appeared in the 1921 play *R.U.R.* by the Czech writer Karel Capek. What is less widely recognized is that Capek's robots were not like the metal humanoids of Fritz Lang's *Metropolis* six years later, but were made from flesh and blood. They were invented by a man called Rossum, and the play's title is the name of his company, Rossum's Universal Robots. Their organs and nerves and bones and so forth are all made in separate vats from a kind fleshy dough and then assembled like the cars that were then rolling off Henry Ford's production line.

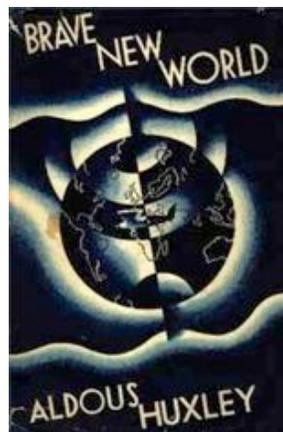


Still from a BBC production of *R.U.R.*, and the robot Maria in Fritz Lang's *Metropolis*.

And this is the key insight of Capek's play, because he recognized that making people in the twentieth century would no longer be the kind of solitary, pseudo-alchemical enterprise that it was for Victor Frankenstein but would be done on an industrial scale for commercial gain. As *R.U.R.*'s director general Harry Domin says, 'Making artificial people is an industrial secret.'

Besides this, *R.U.R.* rehearses all the standard themes of the artificial person. Domin has Promethean ambitions, in this case being to free humankind from the drudgery of everyday labour. But the robots, although generally subservient, asexual and soulless creatures, eventually rebel and kill all the humans so that they might take over the world. In doing so, they acquire a soul, but this is presented not as a real gain but as a kind of fall, an injection of original sin, giving them a human's capacity to act in inhumane ways.

The most influential vision of the artificial mass production of people, however, appeared eleven years after *R.U.R.* premiered. This was, of course, Aldous Huxley's *Brave New World*, in which people are not assembled on the production line but grown in test-tubes and jars from fertilized human eggs.



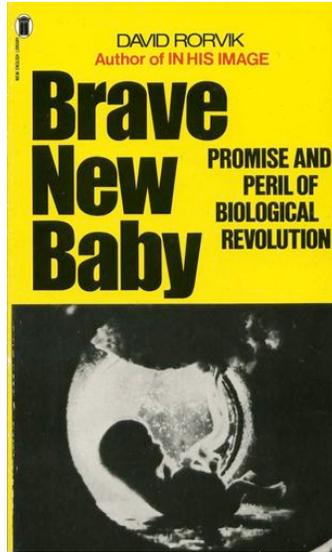
This in vitro gestation was not Huxley's idea, but was a notion being seriously discussed by biologists when he wrote the book, most notably by J. B. S. Haldane in the 1924 book *Daedalus* that I mentioned earlier and by Aldous Huxley's brother Julian, one of the leading scientists of the age – and incidentally the grandson of Charles Darwin's staunch supporter Thomas Henry Huxley. Haldane and Julian Huxley imagined that this process, called ectogenesis [pic], might be used to liberate women from child-bearing, and that it could therefore be used to increase the birth rate among educated, intelligent women who they considered to be the best genetic stock in the population. In this way ectogenesis – what you might more graphically call 'babies in bottles', an image with alchemical associations – ectogenesis was seen to be a technique that could usher in both the emancipation of women and eugenic social engineering. Like many leading scientists of the time, Haldane and Huxley were enthusiastic advocates of eugenics, which they considered to be the only way to prevent a steady decline in the gene pool of the human race due to overbreeding by genetically inferior individuals.

Although it's often assumed that eugenics was abandoned as a disreputable idea after eugenic policies were pursued by the Nazi regime, in fact it was still being actively promoted by some scientists, including Julian Huxley, in the 1960s. In the early part of the century the idea was embraced by many states in the USA, where around 60,000 people were sterilized because of the eugenic laws.

Several feminists in the 1920s and 30s welcomed ectogenesis as an emancipating technology. It was wholeheartedly supported by Shulamith Firestone in her 1970 book *The Dialectic of Sex*, now considered a central text of modern feminism. But others worried, and continue to worry, that it would undermine one of the last preserves of female power and autonomy: the ability to bear children. In response to Haldane's book, meanwhile, the conservative social critic Anthony Ludovici fretted that because in principle one man could fertilize thousands of eggs for ectogenesis, it would lead to a culling of males and a matriarchal society. So here's another one for our list, with a few examples:

Making 'artificial people' will lead to the eradication of men. Or women.

In Aldous Huxley's novel the social engineering made possible by ectogenesis is taken to its dystopian conclusion: the intelligence and abilities of the population are strictly controlled in a many-tiered caste system by chemical control of the gestation process. Given the time in which Huxley was writing, with totalitarian regimes on the rise in Europe and the Soviet Union, *Brave New World* presented what seemed like a timely warning. But it is seized upon today, regardless of our very different political context, as an off-the-shelf apocalyptic scenario to accompany every advance in reproductive technology. David Rorvik, a science reporter for *Time* magazine, set the tone in the title of his 1971 book on the subject – and there are endless examples of how the media has referred to Huxley's imagined future all along the way from IVF to cloning:



‘reminiscent of Aldous Huxley’s *Brave New World*’.
Sunday Times (1965) on initial results of Edwards & Steptoe in *The Lancet*

‘Radical new techniques in biology promise (or threaten) a near-future world of reproduction that is artificially assisted or even sexless and of babies grown in glass wombs in the laboratory’.
Life (1969)

‘Aldous Huxley’s fertilizing and decanting rooms in the Central London Hatchery (*Brave New World*) will become a possibility within the next fifteen to fifty years.’
Paul Ramsey, *Fabricated Man* (1970)

‘She was born at 11.47 pm with a lusty yell and it was a cry round the brave new world.’
Newsweek (1978) on the birth of Louise Brown, the first IVF baby

Here, then, is another mythical archetype for anthropoeia:

Making ‘artificial people’ will be used for social engineering by totalitarian states.

And I might add another implication from Huxley’s book, where these babies gestated in bottles are reared by the state rather than by their genetic parents:

Making ‘artificial people’ will destroy the family.

‘Without safeguards and serious study of safeguards, this new technique could... destroy the sanctity of family life.’
Lord Campbell of Cory, 1982, on IVF

‘transfer of procreation to the laboratory will no doubt weaken what is presently for many people the best remaining justification and support for the existence of marriage and the family.’
Leon Kass, bioethicist, 1971

‘When new methods of human reproduction become available, can traditional family life survive?’

Cover of *Life* magazine, 1969

Of course, you might find it odd that a technique designed at the outset to allow married couples with infertility problems to have children was being seen as a method that would destroy rather than create families. But we should never underestimate the power of unconscious notions about naturalness and unnaturalness. There is magical and mythical thinking at work here, evident in the way for example that around 40 percent of adults in the *Life* poll thought that children conceived by IVF would not feel love for their family. The issue, as these remarks imply, is not whether family units will be created by assisted conception, but whether they would be created *in the right way*.

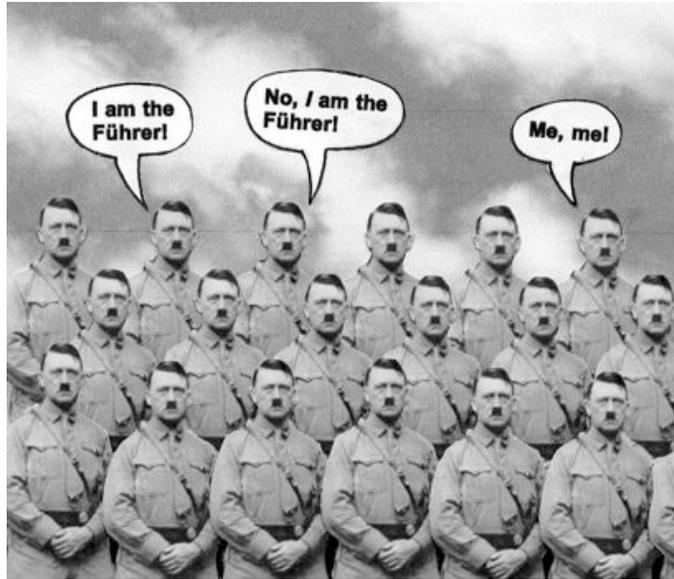
As IVF began to seem a real possibility in the late 1960s, a new fear appeared. In the shadow of Nazism, it seemed conceivable that techniques like this would lead to what some called the creation of a Master Race. In part this is an extension of the fear voiced in Capek’s *R.U.R.* that artificial people will take over the world. But now the idea that the artificial person will be malevolent and hungry for dominance had a new face:



And thus the next myth:

Making ‘artificial people’ will lead to the resurrection of Hitler.

These days it’s not uncommon for our new bogeymen to be substituted in place of the Fuhrer, so that we might see worries about the cloning of Saddam Hussein or Osama bin Laden, just as in 1971 Leon Kass warned about what he called ‘the asexual reproduction of 10,000 Mao Tse-tungs’. But Hitler remains the perennial favourite for this sort of thing, partly thanks to Ira Levin’s 1976 thriller *The Boys from Brazil*, in which Hitler is cloned by Josef Mengele hiding in Brazil. When you think about it for a moment, the idea is so risible that you might wonder why it has persisted for so long. Not only does it posit an absurd amount of genetic determinism, as though Hitler was destined from birth to devise the Final Solution, but it demands a historical determinism in assuming he will always find a route to political power. As for an entire army of this physically undistinguished man – I’m not sure we would have much to fear from that, though it does have some comedic potential:



Idea this silly couldn't last for long unless they were planted in the fertile soil of myth, which here is at root a myth about metempsychosis, the transmigration of souls. I think the whole business is best summed up by a quote from the movie of *The Boys from Brazil*:

Mengele: You are the living duplicate of the greatest man in history – Adolf Hitler!

Cloned boy: Oh man, you're weird.

So here we are, onto cloning already. But I am afraid we can't get very far down that track in the time available, except to say that it has readily absorbed all the standard preconceptions about the artificial human that I have described so far, and several others. To the key question – should we allow the reproductive cloning of humans? – I personally would have to answer 'I don't know'. But I do know that I would respond with another question, which seems to me to be the first we should ask: not 'Is human cloning right or wrong?', but 'Why do you want to do it?' It would seem misguided to decide the issue on the basis of some general notions of right and wrong, or natural and unnatural, rather than looking at the specifics of the situation. One thing is clear, however: when you start to look at the ethical arguments commonly given for why reproductive cloning should be prohibited absolutely, you will very quickly discover the imprint of mythical thinking. For those who oppose cloning, *Brave New World* is often the touchstone for where all this might lead. One reason why this is profoundly misguided is that the dangers of abuses of such technologies today stem not from totalitarian states (who in any cases have much easier ways of achieving their goals than this extremely high-tech one) but from the free market. There is a danger that the political sensitivity of the matter, as with IVF and embryo research, will lead to a situation where politicians simply refuse to take responsibility in the public sector while allowing *laissez-faire* in the private sector. That's not good, for one thing we can say for sure about all of these reproductive technologies is that they need to be regulated. We had a model for such regulation in the UK that was the envy of the world until the Human Fertilization and Embryology Authority was dismantled by our current government.

Perhaps the more pertinent question is: Will human cloning happen? I think the answer will be yes, and probably within the next decade or two. Some say it has already happened, but these claims are made by the kinds of mavericks and egotists who will always appear when society as a whole refuses to take the lead. One of them is this company...



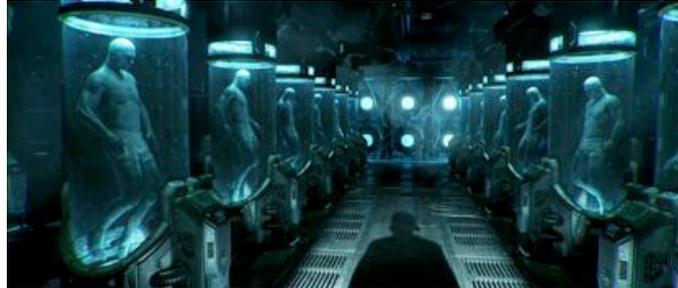
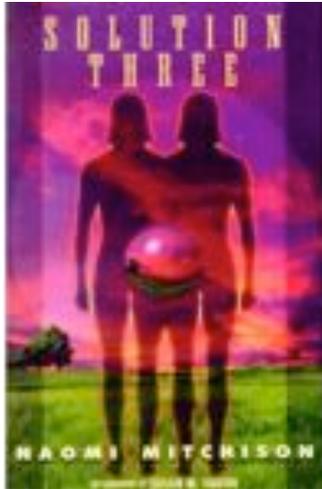
... and you would never imagine from this cosy logo that Clonaid is run from some shady location in the Bahamas, funded by a cult which believes that humans were created by aliens. Clonaid alleged that it created the first cloned child in 2002. Although you shouldn't believe a word of it, let me say that occasionally Clonaid's press statements have much more of a plausible ring to them – like this one:

Clonaid has received cloning requests from around the world... a surprisingly large number come from the Los Angeles/Hollywood area.

As I say, what sets the stage for the future of cloning is the consumer market.

So I'm predicting that reproductive human cloning will happen, for better or worse. And I also predict that when it does, many people will be surprised that the cloned person is a normal human being (who may not even look identical to the genetic donor), just as many were surprised when the first IVF baby, Louise Brown, was born in 1978. The philosopher Gregory Pence, who advocates human cloning and offers one of the best argued cases for why there should be no fundamental ethical objections to it, even thinks that the word 'clone' to refer to such a person should be considered prejudicial, akin to the racist slurs of the past.

Certainly, there's no reason that we know of why a person made by cloning would not gestate and develop in the same way as all of us did, and why they should not be born to loving parents. Of course they would be normal, if we let them be. But we have insisted endlessly that they won't be, even in relatively thoughtful fictionalizations like the novel *Solution Three* by J. B. S. Haldane's sister Naomi Mitchison. Now it is clones, not homunculi or robots or test-tube babies, who are uncanny, spiritually vacant, lacking a soul or a true spark of humanity.



So then, here are some of the key myths of anthropoeia:

1. The 'artificial person' will be monstrous.
2. Technology is inherently perverting.
3. The 'artificial person' has no soul.
4. The 'artificial person' is not like a normal person, but either sub- or superhuman, or both.
5. Making 'artificial people' will lead to the eradication of men. Or women.
6. Making 'artificial people' will be used for social engineering by totalitarian states.
7. Making 'artificial people' will destroy the family.
8. Making 'artificial people' will lead to the resurrection of Hitler.

When we encounter them in the debates about assisted conception, reproductive technologies and embryo research, we should become alert to the fact that the debate has most probably departed from reality and entered mythical territory.

We needn't be surprised to find them very much in evidence in the movies, and to a lesser degree in fiction. But while that certainly helps to propagate them and can cloud the argument, I don't think we need lament it too loudly. I think we're mostly sophisticated enough to know that myth is the currency of movies, even if they do not often have the wit to realize that themselves. We should be far more concerned when these myths manifest themselves unannounced in the proclamations on these topics that come from moralists, religious leaders, politicians and, as we have seen, sometimes even from scientists.

Why do we so resolutely insist on these myths? I believe they are all expressions of a sense that anthropoeia is unnatural. Whether it's Frankensteinian necro-surgery,

Huxlerian ectogenesis, IVF or cloning, artificial intervention in human procreation has always provoked outrage and disgust at first encounter, because it is often held to be the ultimate unnatural act. And to call something unnatural is not an act of taxonomy but a moral judgement. The unnatural act is something we are supposed to condemn.

Knee-jerk journalistic uses of the 'Frankenstein' label now import a set of off-the-shelf prejudices into an invitation to find something wicked and repugnant. Yet why does 'unnaturalness' give us the shivers? Our disapproval stems from the theological tradition of natural law, which Thomas Aquinas formulated in the thirteenth century. Natural law plays out in a rationalistic yet teleological universe in which everything has a part to play, and all things have a 'natural end' which, being ordained by God, is intrinsically good. The 'natural' end of sex is procreation, since traditionally that's where it was apt to lead. Religious objections to IVF and forms of reproductive technology which don't require sexual intercourse invoke this reasoning in reverse: the natural and therefore the only permissible beginning of procreation is sex – which is to say, not sex in the biological sense (sperm meeting egg) but in the anatomical sense of requiring a very particular conjunction of the reproductive organs.

I am not saying that an instinctive sense of aversion or repugnance should be ruled out of court when we debate these matters, but merely that it must be recognized for what it is, and certainly not mistaken for a kind of ethical law of nature. Laissez-faire, blind faith in science and medicine, and a refusal to acknowledge moral and ethical dimensions, would be as disastrous for responsible management of reproductive technologies as would reactionary proscription based on gut instinct and ancient prejudice. There is plenty to debate, and the wisest course is neither obvious nor easily negotiated. But until we can recognize the origins of our preconceptions, and distinguish mythical fears from real and present dangers, we shall have little prospect of getting it right.

It's no surprise that the cultural stock of Frankenstein seems right now to be enjoying a boom period, for better or wise, as shown not just by tabloid headlines but by the recent staging directed by Danny Boyle at the National Theatre in London:



For the decoding of the human genome – or more precisely, the misleading insistence by some in the genomic community that this is the biochemical blueprint for humanity – this confronts us with the unsettling question that electrical and chemical physiology seemed to raise in Mary Shelley's time: *Is this all we are?*

But I believe that Shelley's novel also offers a response to that question. There is an interpretation of her story that is far more useful, relevant and dare I even say true than seeing it as just a Faustian tale about scientific hubris. You see, it is when the Creature lives alongside the De Lacey family and eventually talks with the blind father of the family that he is eloquent, gentle, loving, and more human than ever. And conversely, it is when Victor Frankenstein cuts himself off from his family and fiancée to pursue his obsession that he becomes monstrous. Our humanity, Shelley seems to be saying here, lies not in our material fabric or origins, not in our flesh or our genes, but in the matter of how we inhabit the world in community with our fellow beings. It is there, and not in the material details of how and when our individual life begins, that I believe we must seek our ethical guidance about new means of procreation.