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**The Curse Of Frankenstein: Visions of Technology and
Society in the Debate over New Reproductive Technologies**

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THE CURSE OF FRANKENSTEIN:

Visions of Technology and Society in the Debate
over New Reproductive Technologies

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Abstract

At each successive moment in their development new reproductive technologies have provided the occasion for virulent argument about the role of technology in human affairs. And more generally, technoscientific knowledge has long been held both in awe and suspicion, with the latter acting as a kind of counterbalance to the continuing cultural investment in the image of scientific knowledge as empowerment, as the motive force of beneficial change. Given this cultural ambivalence the paper focuses on media representations of cloning and the 'designer baby' (with the latter enveloping a debate that has run for almost a decade now) and explores the ways utopian images of a world rendered ever more amenable to human desires have been closely shadowed by just as compelling dystopian visions which are nevertheless constructed from the same cultural material. Figures of occidental folklore such as Frankenstein (or Jeekyll or *Brave New World*), thus function as something of a convenient shorthand for articulating unease with the direction and pace of technological development, or even voicing loss of confidence in the modernist technoscientific project of instrumental control. In these circumstances, the chimeric notions of the 'designer baby' or the human 'clone' appear Janus-faced, concurrently representing the powers of human creativity *as well as* the monstrous progeny of an excessive epistemophilia. They are in this sense potent metaphors for the biotechnological revolution's declared power to re-shape both nature and society - for 'good' or 'ill'.

Introduction

A spectre has long haunted modernity, the spectre that everything solid might indeed 'melt into air'. This premonition, simultaneously the source of excitement and apprehension, has increasingly framed occidental encounters with new reproductive technologies. At each successive moment in their development reproductive technologies have provided the occasion for (self)reflection upon, and virulent argument about, the role of technology in human affairs. Over the last few decades, artificial insemination, sperm banks, test-tube babies, the fate of 'surplus' embryos ('snowflakes'), infertility treatment for post-menopausal women, Black women having White children for 'social reasons', the 'harvesting' of eggs from cadavers and aborted fetuses, Dolly (the sheep clone), Polly (the transgenic sheep clone), the ectogenetic goat, the headless tadpole clone, ANDi the genetically modified monkey - not to mention frequent dramatic media reports heralding the imminent arrival of the 'designer baby' or the cloned human - have all featured as foci of interpretive struggle and moral controversy. Together these developments (and this is a far from exhaustive list) signpost the ways in which the body has come to be viewed as the site of an ongoing bio-technological revolution, a veritable new genesis.¹

Against this backdrop, agents of public knowledge such as writers, journalists, academics, pressure groups and the like, by commenting on the nature, capacities, uses, and future implications of reproductive technology, cater to the need to create clarity and meaning out of a reality often too arcane and complex to be represented 'as is'. The esoteric (Fleck, 1979) character of most scientific discourse means that the only way it ever reaches a lay audience or readership is through social processes of representation. According to Nelkin (1987:2), "For most people the reality of [techno]science is what they read in the press. They understand science less through direct experience or past education than through the filter of journalistic language and imagery." Such "popularisation" - if that is the right word - is however *not*, as often claimed, a mere rendering of technoscientific work into more digestible language. Rather it constitutes a *literary* enterprise in its own right, that uses particular technoscientific developments as its source of inspiration (Caro, 1997) and in turn actively shapes cultural expectations of technoscientific work (Fleck, 1979; Squier, 1995). The discussion which follows focuses on the cultural imagery used in the

media to communicate the nature of 'what is happening' and 'why it matters'. It is based on the examination of some 700 articles covering new reproductive technologies which have appeared in the UK over the past 10 years in English language print news media - principally in broadsheets and in (so called quality) tabloids. It is important to stress that we do not aim at any comprehensive presentation of the content of *what* was said in quantitative terms, rather we seek to explore *how* it was said and the discursive resources that were employed in doing so. Taking the media controversies sparked by Dolly the sheep clone (1997), Adam the 'designer baby' (2000), and Eve the 'cloned baby' (2002) as its particular foci of interest, the paper examines the various cultural representations of technology, identity and social organisation such coverage supports.² In contrast to other studies of media coverage of new reproductive technologies that seek to understand how the media shape public understanding through the framing of issues (e.g. Conrad, 1997; Nerlich, Clarke & Dingwall, 1999; Petersen, 2001, 2002), as well as the study of science communication more generally – e.g. in terms of “journalistic practices, routines and intentions” (Hansen, 1994: 112), our focus is on the transgression of social/moral boundaries and thereby the deep well of feeling and revulsion – the *yuk factor* - that media representations tap into and exploit. Images of 'technology', it is argued, function simultaneously as mirrors of 'society', as a means for articulating and rhetorically rehearsing the various philosophical antinomies and moral conflicts characteristic of occidental (post?)modernity: nature/culture, subject/object, society/individual, free will/determinism, and so on. Accordingly, the paper examines the representational resources utilised in the broad discursive struggles over the determination of the meaning of the new reproductive technologies.

The organisation of the paper is as follows. First we consider the media responses to Dolly and Eve and how the former was seen as the harbinger of the latter. The theoretical lens used to illuminate the character of the associated imagery allows us to draw out the ways in which the media reporting played on the transgression of social boundaries. The second section then turns to consider Adam and the media ambivalence surrounding his birth. Of particular note here is the contrast between (utopian) therapeutic uses of the new technology and (dystopian) visions of a natural order transgressed and subordinated in the pursuit of knowledge and the remaking/re-

designing of the body - *at will*. Having focused on the media representations of new reproductive technologies we then proceed to consider something of the historical origins of the cultural imagery setting forth the expectations about the technological reproduction and re-making of the body of which the 'designer baby' can be seen as the culmination. In this connection Haldane's *Daedalus, or Science and the Future* (1924) is drawn upon as a landmark statement of the future possibilities of biology. The final section discusses the mechanical reproduction (pace *Brave New World*) and re-fashioning of the human body in light of the curse of Frankenstein and its prevalence as a discursive resource for commentary on the technoscientific endeavour.

Chronicle of a Birth Foretold

"One doesn't expect Dr Frankenstein to show up in wool sweater, baggy parka, soft British accent and the face of a bank clerk. But there in all banal benignity he was: Dr Ian Wilmut, the first man to create fully formed life from adult body parts since Mary Shelley's mad scientist" (*Time*, 10 March 1997: 42-3)

A shared reference point for debates over reproductive technology is the successful 'cloning' of an adult sheep by scientists at the Roslin Institute in Scotland. The birth of 'Dolly' the sheep clone in February 1997, whipped up a frenzy of speculation on the prospect of human cloning. President Clinton immediately demanded that the National Bioethics Advisory Commission report to him within 90 days on the "troubling implications" of mammalian cloning. That same week the matter was raised in the House of Commons at Prime Minister's Question Time with the parliamentary committee on science and technology commencing an urgent inquiry into the Roslin experiments. The Vatican urged a worldwide ban on cloning, while physicist Joseph Rotblat, Nobel laureate and anti-nuclear weapons campaigner declared that genetic research posed a danger far greater than the Bomb "because of these dreadful developments that are taking place there".³ A Harvard professor wrote to *Nature* demanding that publication of the Roslin results be suppressed as such dangerous knowledge should not be publicly available. In California the death penalty was proposed as the only punishment fit for the cloners of humans. The sheep clone is, *Time* magazine announced, "an epochal - a cataclysmic - creature" (op.cit.). The scale and vigour of such reactions revealed that something more was seen to be at

issue here than an (however complex) experiment in biology. Rather, it seemed, it was Pandora's box itself that had been opened. Within less than a year, Dolly had been followed by Polly, the transgenic sheep clone; the ectogenetic goat; and the headless tadpole clone. Could the dreaded human clone be lurking too far behind? While the technoscientific establishment (including the Roslin researchers)⁴ invoked human reproductive cloning for the sole purpose of denying it (as technologically unfeasible or ethically reprehensible), such denials only served to keep its image in the press. Meanwhile, beyond the boundaries of respectable technoscience, an informal race was developing among controversial mavericks such Richard Seed, Panos Zavos and Severino Antinori, concerning who would be the first to successfully clone a human.

On the 27th of December 2002, Dr Brigitte Boisselier director of Clonaid the 'research arm' of a bizarre New Age cult the Raelians, proclaimed to the world's media the creation of the first human clone: a 7lb baby girl named "Eve" supposedly born by caesarean birth to a 31 year old 'American mother' at 11.55am on December 26th. Within days of this announcement, Clonaid maintained it had produced a second human clone this time born to a Dutch lesbian couple. Three more, the sect claimed, were to be born within the next few weeks (e.g. *The Independent*, 6 January 2003: 2).⁵ The group's assertions were greeted with near universal derision. The announcement(s) were widely described as a stunt in Clonaid's "sick race for publicity with controversial Italian fertility doctor Severino Antinori and US expert Dr Panos Zavos" (*Daily Mail*, 28 December, 2002: 1) both of whom had claimed to be on course to produce clones in early 2003. Ian Wilmut and the Royal Society poured further scorn upon the Raelians' pronouncements and declared deep concern about the welfare of anyone involved in cloning experiments. While Clonaid had promised that all the babies in question would undergo genetic testing to prove their status as clones, the promised tests never materialized. Clonaid argued that a threatened lawsuit by Miami children rights advocate Bernard Siegel who was seeking to place Eve under court protection and remove her from her family "had given them cold feet" (*The Times*, January 4, 2003: 4). However incredulous the Raelians' claims might have been, there was scant reassurance to be had for those concerned about the implications of human cloning. As the *Daily Mail* commented:

".... there [is not] much comfort to be taken from the possibility that the Raelian claim is unfounded. For most analysts predict it is only a matter of time before some, perhaps similar, group produces a human clone with all the profound emotional and social consequences such a breakthrough threatens... the result could be the stuff of nightmares for us all" (28 December 2002: 4)

What kind of stuff are nightmares made of? Here is, for instance, the predicament of the human clone (Eve?) as imagined in a *Daily Telegraph* editorial:

"Imagine finding out, when you are just old enough to understand it, that you have been artificially created as the precise copy of someone else. Perhaps you are the replica of the woman you thought was your mother, which would mean that the closest thing you have to a father is really your grandfather. Or perhaps you have been cloned as a copy of a famous scientist, doomed always to have your life measured against hers. You might even have been manufactured by cultists who believe in alien abductions. For once the technology needed for human cloning becomes available, it would be hard to restrict its use" (30 December 2002: 19)⁶

From this account, the human clone emerges as an anomalous, excessive object, something that jumbles up social categorisations. Drawing upon Durkheim's (1948) arguments on the distinctiveness of the sacred and the profane Mary Douglas (1966) argues that boundary work is an essential element in sense making. The ordering and naming practices that allow some objects to be grouped together but not others, can thus be seen as the means through which human collectivities render the world intelligible. Following this line of reasoning, new reproductive technologies can be understood as problematic objects insofar as they represent the possibility of displacement and disruption of the classifications constitutive of the extant social and moral order.⁷ As Douglas notes, classificatory schemata generate cultural anomalies and ambiguities: objects, which do not fit, or alternatively, which may fit more than one (ostensibly distinct) category. Concepts such as 'designer babies' or 'genetic engineering', for instance, belong simultaneously to distinct and even incompatible realms of experience and systems of meaning. The new technologies thus stand in for the possibility of bringing together into a single identity previously contradictory signifiers, as once natural boundaries - between nature and artifice, birth and manufacture, the womb and designer commodities - are displaced by technological change (see also: Strathern, 1992b; Edwards et al, 1993). What may once have been

construed as an oxymoron – e.g. a designed human being - now appears as a realistic prospect.

According to Douglas, the human body is typically conceived as a conceptual model, or symbolic stand-in, for the social collectivity of which it is part. As we have already seen, in addition to the clone, the controversy that is the focus of this discussion, revolved around a number of anomalies including *inter alia*: Post-Menopausal Mothers, Black Women implanted with White Donor Eggs, reproduction through the use of ova from cadavers and aborted fetuses, transgenic sheep clones, pigs with human hearts, mice with human kidneys, and ectogenetic goats. All of these examples could be read as physical metaphors for boundary displacement. Boundaries constituted by age (the post-menopausal mother); race (the Black mother with the White child); life and death (the use of eggs from aborted fetuses and cadavers); parentage (the clone); species, (the mouse with a human kidney); the body (the ectogenetic goat and the headless clone); genetically desirable and genetically undesirable (embryo selection); and so on. All can be represented as ruptures in the fabric of the social and moral order. To the extent they can be seen to bring existing conceptual/social categories into confusion, they subvert an otherwise orderly reality. Correspondingly, their uncertain status is conveyed within media discourses by the adoption of a vocabulary of displacement, transgression and violation (Bloomfield and Vurdubakis, 1995). Each such category slippage is articulated in terms of feelings of anxiety, disorientation, fascination and awe. Thus: "The intention to reverse the changes brought by the menopause" noted a *Daily Telegraph* editorial (1995), "strike[s] most people intuitively as an unacceptable interference with the limits that nature has set"; while anti-abortion campaigner David Alton MP was reported in *The Sunday Times* to have spoken of a: "macabre and gruesome development which denies the great gift of life itself to the unborn but uses it to create new life unnaturally in a laboratory" (cited in Lightfoot, 1994).

Regarding the natural relationship between generations (that is, mother, daughter, granddaughter and so on), Oddie (1994) argued in *The Sunday Times* that:

"Even Mary Shelley would have found it difficult to imagine the possibilities that could now open out.... An older woman could become mother to her own granddaughter, the macabre possibilities are endless"

Categorical structures carry a moral urgency, moral breakdown is therefore often seen to follow closely on from boundary transgression. Given such premonitions, the developments underway can be seen as but steps along a slippery slope to moral bankruptcy (Mulkay, 1987) - as indicated in the following statement in *The Independent* by John Habgood (1994) Archbishop of York:

"From the choice about whether to have a baby by means of a donor, it is a small step to choices about what *kind* of baby, and from there, as experience in the United States has indicated, to litigation if the "product" is not up to specification."

Thus the sacred is invaded by the profane, human life commodified and rendered into a consumer product. The concept of unstoppable contamination once the boundaries are breached, is the crucial component in *slippery slope* arguments where the spectre is raised that such transgressions may become the norm, assimilated into routine procedures of reproduction, and thus rendered mundane. Since the new technologies are said to be in the business of bringing into existence what was up to then deemed impossible, boundaries can no longer be policed by nature itself. As Lee M. Silver of Princeton University put it, Dolly's creation "basically means there are no limits. It means all of science fiction is true" (cited in Ross, 1997; see also Silver 1998; Wilmut et al, 2000).

"How long will it be before parents sit down in front of a computer screen and design their child?" *Daily Mirror* (10 January 1994)

"The nature of a person will become far less a matter of chance and more one of choice. We may not be able to choose our parents, but we will be able to change our children by amending or indeed designing their genetic make-up. States will have the potential to engineer the nature of their citizens." *The Independent* (8 January 1994)

Visions such as this further reinforce a view of technology as an autonomous force, a kind of genie that once released, cannot be returned to the lamp. Society thus appears condemned either to repeat a horrific past (Nazism) or to enact some vision of a dystopian future (*Brave New World*) - thus one article in *The Sunday Times* was entitled "The Master Race: Designer Babies" (Hodgkinson, 1994). The notion of the 'designer baby' can therefore be seen as representing the paradoxical combination of two contradictory threats: the spectre of individual difference overwhelmed by standardisation (Nazism/*Brave New World*) coupled with the spectre of social

institutions giving way under the pressure of unconstrained individual choice (captured in the notion of babies as designer goods) (Hirsch, 1993; Bloomfield & Vurdubakis, 1995).

Against this background the status of the clone deserves a closer examination. The notion of the 'exact copy' foregrounds concerns about the effects of technology on the human Self. Cloning in this sense, constitutes a challenge to embodiment, the Self's ontological basis. As such, it is seen as an assault upon human self-recognition, threatening personhood and identity with dissolution: If individuals can be 'copied' then their individuality is compromised.⁸ Hence the suggestion by the American Institute of Bioethics (1997) that the cloners of humans should be prosecuted under US anti-slavery legislation. However, if reproductive technology stands accused of undermining identity, it is also accused of its opposite: of rendering identity excessive. The rich and powerful, the Hitlers and Saddam Husseins of this world, it is claimed, will take the opportunity provided by the new technology in order to duplicate themselves (Ira Levin's *Boys from Brazil* often enlisted as the literary reference for this argument⁹). In either case the boundary between Self and Other is subject to slippage and breakdown.

The notion of boundary transgression, and thus pollution, illuminates the abhorrence usually associated with anomalies - the so-called *yuk factor* - but further, it also indicates the role of pollution fears in shoring up particular moral positions and social arrangements (Douglas 1966). Pollution ideas are deployed in order to safeguard boundaries protecting cherished categories. In the case of the new reproductive technologies, what is seen as threatening is not the fact that these interfere with natural processes (all medical interventions do), but that they do so in a manner that is qualitatively different from before:

"If normal medicine is the maintenance and restoration of what nature has given, human genetic engineering has to do with steering nature out of its normal channels, taking upon ourselves the creation of life itself: literally, playing God.... reference to Frankenstein and his monster is by no means inappropriate." (Oddie, 1994).

'Normal' medical practice thus appears as the restoration of a natural order subverted by disease and abnormality, in contradistinction to genetic engineering which

constitutes a technological perversion of that order. The possibility which exercises the author of this extract is that genetic engineering may be smuggled in as normal medicine¹⁰. However, the same vocabulary of purity and pollution can be manoeuvred in order to show the same set of developments in a reassuring light. In other words, positive perceptions of the new developments, while perhaps less prominent in comparison with the (mostly) negative responses we have examined so far, also tend to rely upon similar imageries of displacement and of purity versus pollution. Briefly, arguments in favour of the new techniques involve a shift of focus in what is considered the polluting object. Attention is now being focused on the possibility of genetic abnormality, hereditary disease and so on. Where *nature* is seen to be cruel or flawed - as in the case of the child born with a genetic disease or a woman unable to conceive *in vivo* - then science and technology may be called upon to repair the natural order. This notion of assisting nature, or making up for its deficiencies, can be taken further. For instance, as expressed by Severino Antinori - would-be-cloner and a figure also at the center of earlier furores concerning technologically assisted pregnancy in post-menopausal women, the growth of human sperm in rats, and helping a Catholic priest have a baby without compromising his celibacy¹¹:

"In Britain you have abortions. I create life rather than destroy it... It's every woman's right to have a baby - and if nature is refusing to help, I take over" (cited in the *Daily Mirror*, 19 August 1994)¹²

Or as Dr Weatherall of the Institute of Molecular Medicine in Oxford has argued:

"as Peter Medawar has reminded us, if modern evolutionary theory has told us anything, it has made it abundantly clear that nature does not always know best." Weatherall (1995: 121-2)

Thus, positive responses to new developments in reproductive technology tend to be couched in a therapeutic vocabulary. They often draw upon pictures of healthy babies - "a little miracle of science" (*Daily Mail*, 19 January 1996: 1) - within happy families¹³: a vision of technology and society working in harmony towards a better future (Mulkay, 1997). What opponents argue are grotesque violations of the natural order, are revealed as little more than morally sound extensions of established medical practice. They are still 'new' but no longer qualitatively different. Thus re-situated, a contested technology can now be seen as constituting the means of salvation for the suffering and the desperate (Franklin, 1990). The rhetorical tension between hope and

fear, positive and negative, utopian and dystopian narrative tropes, that attends and indeed fashions the debates surrounding new reproductive technologies was very much in evidence in coverage surrounding the birth of the world's 'first designer baby' as we explore below.

The Two Versions of Adam

“The Birthday Boy Who Was Made-To-Order: Party for the ‘spare-parts baby’ and the sister he saved” *The Mail on Sunday* (26 August 2001)

Adam Nash, born on 29th August 2000 in the USA, proclaimed in the media as “the world’s first designer baby” (*Guardian Unlimited*, 4 October 2000; *The Mail on Sunday* 26 August 2001); a “‘custom-made’ boy” (*The Guardian*, 20 October 2000), became a focus of celebration and joy contrasted with concern and fear. For his family his birth enabled the possibility of saving the life of his sister Molly who was born with a severe genetic condition (Fanconi’s anaemia). What the family needed was a donor whose tissue type was as close to Molly as possible and so the possibility arose of conceiving a sibling that could be such a donor. However, any such sibling might also carry the genetic fault. Accordingly, following IVF procedures some twelve embryos were produced from Molly’s parents. From amongst these, one embryo was selected for implantation because pre-implantation genetic diagnosis (PGD) indicated that it did not carry the fatal disease afflicting Molly.¹⁴ Molly’s mother underwent a successful pregnancy and shortly after Adam’s birth a subsequent transfer of cells to his sister was reported as being successful in enabling her to produce the particular sorts of blood cells that her condition had prevented.

Thus one might say that Adam was conceived, selected, and born with a specific purpose, as part of a plan:

“‘Designer baby’ cures sister” *The Guardian* (20 October 2000)

Following Molly’s recovery Mrs Nash is reported to have stated:

“The other night, she and I were playing in her room and a song came on and she got on the floor and started dancing... And that was when we knew that this was the right thing to do.” *The Guardian* (20 October 2000)

But however compelling the imagery of being born predestined to deliver the gift of

life to a suffering sibling, an almost inevitable sense of unease haunts the commentary, the spectre of other far less noble uses of the techniques involved. Not unexpectedly then, as with the other new technological developments discussed above, coverage of the birth of Adam Nash yielded a wide range of highly ambivalent metaphors, images and allusions.

“But whilst the case has inspired sympathy, it has also increased fears of babies becoming “commodities” where intelligence and athletic prowess are bought. The genetic Pandora’s box is open.” *Guardian Unlimited* (4 October 2000)

The *Designer Baby* therefore appears in the form of an inferential leap: from the reported developments it is inferred that the commodity baby, designed to order by scientists, is the logical endpoint of the technological trajectory signposted by existing techniques. It signals the culmination of the technoscientific preoccupation with the abolition of all human imperfection. While Adam Nash’s genetic make-up was of course not the actual object of design it could be argued that the selection of his embryo from among others does constitute design, since his particular configuration of genes were chosen in preference to those of others. As such his conception, selection, implantation and birth can be seen to represent but another step along the road to the next stage in baby design. At the same time, following the birth of Adam Nash a number of other couples with sick children also found hope in the prospects offered by the new technology (*The Sunday Times*, 2002).¹⁵ For instance, in Britain Raj and Shahana Hashmi applied successfully to the Human Fertilisation and Embryology Authority (HFEA) in February 2002 to use embryo selection to produce a donor for their sick child Zain. Commenting on the decision a member of LIFE, the anti-abortion pressure group, was reported as follows:

“Should we allow a child to be manufactured in order to serve the medical needs of an older brother? Whilst the term ‘designer baby’ is often overused, it is all too appropriate in this case.” P. Garrett (cited in *The Guardian* 23 February 2002)

However the permission granted by the authority was challenged in the High Court at the end of 2002 by the lobby group Comment on Reproductive Ethics (CRE) on the grounds that that the HFEA exceeded its authority. In the event the presiding judge ruled that the HFEA had: “no legal power to license embryo selection by tissue typing to help sick brothers or sisters” (cited in *The Guardian*, 21 December 2002). The

application by Jayson and Michelle Whitaker whose son Charlie is suffering from Diamond-Blackfan anaemia was also refused (this time by the HFEA¹⁶). Ms Quintavalle, representative for CRE, commented:

“With social sex selection around the corner and innumerable other designer baby possibilities on the horizon, today’s judgment is particularly timely. These vital issues involve the very essence of what it is to be human.” (Ibid.)

In contrast, from the point of view of the anxious mothers such as Shahana Hashmi, denial of access to the contested techniques is re-inscribed in terms of what media researchers call the ‘injustice frame’ (e.g. Ganson 1992; 1995), since those challenging the HFEA decision,

“could destroy not just Zain’s right to life but that of hundreds of other children. What gives them the right to interfere in other people’s lives?” (cited in *The Guardian*, 21 December 2002)

While for Jayson Whitaker, the HFEA refusal to allow the techniques in her son’s case was inexplicable:

“how can it be against the law to try to save your son’s life?” (cited in the *Daily Mail* 5 August, 2002: 24).

Taken together then, the two stances outline something of the dilemma that arises from the opposition between the notions of individual (or family) need, freedom and choice, and society’s right to exert control over what interventions in reproduction can and can not be allowed. (And of course by implication rulings on such matters shape what ‘kind’ of human beings are born.) Notably, again we can observe that with some interested parties the language with which their anxiety is expressed invokes the infamous ‘yuk factor’:

“It is deplorable to use the suffering of families as a means of emotional blackmail to demand that human embryos in the test tube can be chopped up, tested and discarded as if they were inert samples from an industrial chemical process.” Paul Tully for SPUC¹⁷ (cited in *The Daily Telegraph*, 21 December 2002)

While for others new reproductive technologies are not the harbinger of a society in which children have been rendered – in the words of President Bush - into “products to be designed and manufactured” but simply the most medically efficacious means to

a worthy end. Thus Dr Vivienne Nathanson of the British Medical Association responded to the court ruling in the following terms:

“As doctors, we believe that, where technology exists that could help a dying or seriously ill child without involving major risks for others, then it can only be right that it is used.” (cited in *The Daily Telegraph*, 21 December 2002)

The case involving the Hashmi family was heard before the Court of Appeal in April 2003 with the HFEA successfully overturning the High Court ruling: “Judges give go-ahead for ‘designer baby’ with tissue match to sick boy” (*The Guardian*, 9 April). However, later, when giving reasons for their ruling in May 2003, the appeal court judges declared that it “would not result in a ‘free-for-all’ or open the way to IVF for ‘social selection’” (cited in *Guardian Unlimited*, May 17). Further, one of the judges, Lord Phillips, ruled that “IVF treatment can help women to bear children when they are unable to do so by the normal process of fertilisation.” (Ibid.) Again technology is seen as a means of assisting nature or making up for its deficiencies. And while embryo screening was seen to allow choices about the characteristics of children born through this method, thereby raising ethical issues, the choice was ruled to be one that lay with the HFEA on the authority of parliament.

The interpretive tensions in the coverage of the ‘designer babies’ in question - and of the embryo selection techniques employed in their creation - index their status as problematic objects. Once again we see that the boundary between nature and society, between legitimate and illegitimate medicine, need and desire is unstable and contested. The tension between the contrasting problematisations is conveyed and reinforced by the ambivalence that creeps into much of the associated press coverage. Thus it is to be noted that while the press makes frequent use of emotive terms that play on the ‘yuk factor’ – designer baby, custom-made, spare parts, made to order etc. – these are often sanitised within quotation marks. At one and the same time, this use of quotation marks denotes distance and connotes proximity. It functions to reinforce the undercurrent of prophecy and premonition, which inflects so much of the press coverage on new reproductive technologies. Intentionally or otherwise it conveys the impression that the developments reported might not (yet) amount to full blown instances of baby design, but they nevertheless constitute significant steps along the way¹⁸. If the designed baby can be thought of as the logical culmination of a path of

progression that is indexed by all the developments in new reproductive technology referred to earlier (as well as those not discussed here) we would ask what the origin of this path might be. Accordingly, the next section considers something of the historical imagery that has informed, but also in a way set some of the terms for, contemporary deliberation on *where biological science is taking us*.

Frankenstein Unbound?

We have already referred, or alluded to, the profusion of future-oriented images in accounts of new reproductive technology. Such imagery tends to draw, either directly or by implication upon a shared teleology of technology: Utopia – or for that matter dystopia – tends to be thought of less as a place and more as something that is established in the future (Nowotny, 1984). It could be argued, that a key moment in the history of this imagery occurs in the 1920s when the notion of reproductive technology provided a new discursive register for social debates - such as that between the socialist British biologist J.B.S. Haldane (1924) and philosopher Bertrand Russell (1924) - on the potential of scientific knowledge to generate and uphold new forms of social organisation. Haldane's paper, *Daedalus, or Science and the Future* takes as its starting point the potential of "biological interventions" to transform society and sets out to outline how this is expected to rewrite the logic of the social order. Using (in part) the format of a retrospective essay by a twenty first century undergraduate "on the influence of biology on history during the 20th century" (p.39), the paper argued that the future of society would be shaped more and more by biological knowledge and its applications, just as in the past physics and chemistry had been the driving force of change. The argument was illustrated via a (part factual part fictional) narrative of developments in reproductive technologies culminating in a world in which ectogenesis - conception and development outside the womb - is the dominant form of reproduction, with "less than 30 per cent of children born of woman". A world where parents could effect any improvement they chose upon the gene pool, shaping each generation as desired "from increased output of first-class music to.... decreased convictions for theft" (op. cit.). In this context human cloning if accomplished provides an excellent means for increasing the number of society's most useful members. In such a society, "a great mathematician, poet or painter, could most usefully spend life from 55 years on in educating his or her own clonal

offspring". Haldane's vision is of a world being perfected through the deliberate application of certified knowledge and the corresponding displacement and suppression of unwarranted beliefs.

"Our essayist would then perhaps go on to discuss some far more radical advances made about 1990, but I have only quoted his account of the earlier applications of biology.... If reproduction is once completely separated from sexual love mankind will be free in an altogether new sense. At present the national character is changing slowly according to unknown laws. The problem of politics is to find institutions suitable to it. In the future perhaps it may be possible.... to change character as quickly as institutions. I can foresee the election placards of 300 years hence, if such quaint political methods survive, which is perhaps improbable, "Vote Smith and more musicians", "Vote for O'Leary and more girls", or perhaps finally "Vote for Macpherson and a prehensile tail for your grandchildren". We can already alter animal species to an enormous extent, and it seems only a question of time before we shall be able to apply the same principles to our own" (1924: 42-3).

From the point of view of the argument developed here, of special interest is the central overreaching metaphor employed by Haldane, that of "the first modern man" (p.36): Daedalus the Athenian inventor and builder of moving statues. As legend has it, Daedalus thought up and made the contraption responsible for the Minotaur, the monstrous offspring of Queen Pasiphae and a bull. Daedalus' "success in experimental genetics" (Haldane, 1995 (1924): 37) incurred King Minos' wrath and caused Daedalus' imprisonment, whereupon he designed wings for himself and Icarus, his son and apprentice, and flew away from Crete. Daedalus escaped successfully, but Icarus, intoxicated with flight, flew too high, the wax with which his wings were held together dissolved as he neared the sun, casting him down to drown in the sea that still bears his name. Thus Icarus became a symbol of human pride and misplaced self-confidence - and a warning to stay within the limits set by nature.

Accordingly, *Icarus or the Future of Science* - Bertrand Russell's (1924) response to *Daedalus* and its rewriting of both life and politics - counterpoises the metaphor of Icarus who having acquired the power of flight "was destroyed by his rashness".

"I fear", he concluded, "that the same fate may overtake the populations whom modern men of science have taught to fly.... Technical scientific knowledge does not make men sensible in their aims.... science has not given man more self control, more kindness

or more power in discounting their passions"

We may see in the rival positions articulated by *Daedalus* and *Icarus* the ambivalence associated with cultural representations of technoscience. Let us return briefly to Haldane's attraction to the mythological figure of Daedalus. Daedalus "the first to demonstrate that the scientific worker is not concerned with gods"¹⁹ (p. 37) was intended as a replacement for the transgressive figure of Prometheus "the chemical or physical inventor" (p.36) as a more appropriate metaphor for modern biology's power to reshape society. But perhaps one might see a subtext here: Prometheus was of course the model for Mary Shelley's (1993) inventor Victor Frankenstein, himself a common metaphor in debates over reproductive technologies (Turney, 1998; Mulkey, 1997; Rollin, 1995; Bloomfield and Vurdubakis, 1995).²⁰ Destroyed by his rashness – not unlike Icarus - Frankenstein, the *New Prometheus*, has nevertheless a lot in common with Haldane's "scientific worker". What distinguishes Frankenstein's experiment from the activities of the alchemists, occultists, and other such real or fictional predecessors is his Baconian materialism - symbolised in his project of the machine-like construction of a human being from an assortment of parts taken from corpses:

"I will pioneer a new way.... and unfold to the world the deepest mysteries of creation" (p.37) exclaims Shelley's anti-hero. "banish disease from the human race and render man invulnerable to any but violent death.... Life and death appeared to me ideal bounds which I should first break through and pour a torrent of light into our dark world. A new species would bless me as their creator and source; many happy and excellent natures would owe their being to me."
(Shelley 1993: 30-44)

Frankenstein's plan for perfecting the world and its inhabitants has proved enduring in both fictional *and* factual treatments of the theme of artificial reproduction, and his dream has continued to excite the technoscientific imagination. For instance, in *The Second Creation* (their 'insider' account of the making of Dolly), Wilmut et al (2000) set out the implications of their work as follows:

"As decades and centuries pass, the science of cloning and the technologies that flow from it will affect all aspects of human life - the things that people can do, the way we live, and even, if we so chose, the kinds of people we are. Those future technologies will offer our successors a degree of control over life's processes that will come effectively to seem absolute. Until the birth of Dolly scientists were

apt to declare that this or that procedure would be 'biologically impossible' - but now that expression seems to have lost all meaning. In the 21st century and beyond human ambition is bound only by the laws of physics, the rules of logic, and our descendants' own sense of right and wrong" (17)

With unintended irony, their vocabulary echoes that of Frankenstein. A glimpse of this post-natural age where the limits set by biology have been transcended was also conveyed three decades ago by Alvin Toffler in *Future Shock* (1971). In a section entitled "The Pre-Designed Body" (1971: 183), he voiced the expectation that:

"New genetic knowledge will permit us to tinker with human heredity and manipulate genes to create altogether new versions of man."

Influenced by Haldane, Toffler's ensuing discussion encompasses a wide range of possibilities including cloning, the development of artificial wombs, and eugenics etc.

"within a mere ten to fifteen years a woman will be able to buy a tiny frozen embryo, take it to her doctor, have it implanted in her uterus... The embryo would, in effect, be sold with a guarantee that the resultant baby would be free of genetic defect. The purchaser would also be told in advance the colour of the baby's eyes and hair, its sex, its probably size at maturity and its probable IQ.... We shall also be able to breed babies with super-normal vision or hearing... and countless other varieties of the previously monomorphic human being" (Toffler, 1971: 185-7)

Clearly, Toffler's "practopia" is the realization of Archbishop Habgood's nightmare image. Toffler thus goes on to raise the possibility of "breeding men with gills ... for efficiency in underwater environments" (p.187) or even a "prehensile tail" (p.188). Haldane had of course already made that suggestion in *Daedalus* (p43). Returning to the theme in 1963, he proposed the grafting of animal genes as a means of inducing human phenotypes better adapted for particular tasks. For instance, life in space, could he recommended, be improved by "prehensile feet, no appreciable heels, and an ape like pelvis" (Haldane cited in Dronamraju, 1995).

The idea of resolving the nature/nurture, society/individual antinomy by designing humans to meet required specifications has thus proved a remarkably persistent theme in discussions of the future possibilities of new reproductive technologies. Questions of aptitude and skill are thus recast. Instead of simply *training* individuals to master particular skills, the seductive/unsettling alternative is envisaged of *breeding* such

skills in them. The vision of (genetically) re-engineering, so to speak, the workforce is raised as a possibility. Lyon and Gorner (1995: 566) for instance claim that:

"Astronauts on interstellar voyages would benefit if they were able to subsist on a plentiful, nonperishable food supply. Thus we might want to outfit them with termite digestive genes so that they could live on a diet of cellulose... (I)t is almost assuredly going to be possible to produce human hybrids with capacities far beyond the norm. Clearly such a technology will involve ethical questions that dwarf virtually anything we have had to deal with before... *Would underwater farmers with webbed feet and gills be considered as fully human as the rest of us?* (emphasis added).

Thus molecular biology opens up the 'human' to re-engineering and modification. It becomes subject to assembly and disassembly. Organisms are to be viewed no longer as entities but more like jigsaws open to recombination (cf. Cooper, 1995).

Recombinant DNA processes, it is envisaged, will become the basis of a genetic *ars combinatoria*, dis-assembly and re-assembly not only within but also between species. Taking an example of the media representation of this vision, the "prospects for the future" were summarised by *Newsweek* (1994: 43) in the following terms:

"Someday science may be able to manipulate men hormonally to carry fetuses, or put human embryos into animal surrogates - could your mother, as well as your forefathers - be a chimpanzee?"

It is perhaps easy to dismiss this belief in the total plasticity of human biology, what is interesting however is the way such visions rely upon and embody the idea of an autonomous 'internal' logic of scientific and technological development. The same notion of the technology is prone to both unbridled enthusiasm and radical self-doubt. Thus Frankenstein imagines a "race of devils" emerging from his laboratory for which "future ages might curse me as their pest" (Shelley, 1993:163). Victor's dark doubts are a simple reversal of his earlier, utopic vision. In similar terms Toffler (1971: 184) voices his own doubts:

"The ethical, moral and political questions raised by the new biology simply boggle the mind. Who shall live and who shall die? What is man? Who shall control research into these fields? How shall new findings be applied? Might we not unleash horrors for which man is totally unprepared? In the opinion of many of the world's leading scientists the clock is ticking for a 'biological Hiroshima!'."

In *The Third Wave* (1980), Toffler argues that the same questions he raised earlier still

apply; that though some regarded his forecasts as "farfetched" this was "*before* 1973 and the discovery of the recombinant DNA process. Today the same anguished questions are being asked... as the biological revolution gains runaway speed." (Toffler, 1980: 161) In other words, the trajectory set out in *Future Shock* is indexed and reaffirmed by the developments that followed after its publication. Thus the certainty afforded by the scientific understanding of the codes which program biological existence, and the techniques of genetic engineering which are founded upon it, are called upon to authorise the validity of the far reaching projections made previously. "It is too early to say with confidence how biotechnology will develop. But it is too late to turn back to zero. We cannot undiscover what we know. We can only fight to control its application..." (1980: 164). This vision of irreversible change, speaks to both technological optimists and pessimists, those excited by, and in awe of the dawning "age of biological control" (Wilmot et al, 2000), and those repulsed by it. It is not therefore altogether surprising that technoscience – often seen as the very the embodiment of reason - is at the same time so prone to mythologisation.

The Body in the Age of Technological Reproduction

"The body is a model which can stand for any bounded system. Its boundaries can represent any boundaries which are threatened or precarious. The body is a complex structure. The functions of its different parts and their relation afford a source of symbols for other complex structures" (Douglas, 1966: 116).

Aldous Huxley's *Brave New World* – inspired in part by *Daedalus* - dated itself from the year of operation of the Ford assembly plant in Highland Park. In the novel, the 'genetic engineering' techniques described by Haldane are subjected to assembly line efficiency - Frankenstein's project carried out on an industrial scale. The dystopian landscape of *Brave New World*,²¹ can be seen as a parody of Walter Benjamin's (1979) characterisation of modernity as "the age of mechanical reproduction". Modern technologies of "reproducibility" (e.g. photography) argued Benjamin, cannot but entail a loss of "aura" in the object so reproduced. Benjamin's analysis is echoed in Heidegger's (1977) lament of "enframent" as the process through which the world and everything in it, human beings included, is harnessed as a "standing reserve" or "stock" (*Bestand*). Thus the mighty Rhine is "enframed" by the power plant and harnessed as a source of hydroelectric power. This entails its loss of "aura" (in Benjamin's terms) and its reduction to the status of (usable) standing reserve.

Cloning in this context can be seen as the ultimate technology of "reproducibility". Much of the controversy referred to above can therefore be seen as centred on the loss of aura it promotes (in human and ungulate alike). What is interesting however is the ways in which reproducibility enables the constitution of the subjects of cloning as standing reserves, or as a form of capital awaiting commercial exploitation (see: Franklin, 2000). In this regard obvious commercial applications involve the reproduction of high yielding cows and champion racehorses. Beyond that, cloning has found a role in efforts to alter the genetic make up of animals through the introduction of human genes in order to produce new variants, which will provide human milk, drugs, experimental subjects for medical research, or serve as incubators of transplant organs. As regards (the yet unrealised) human cloning, suggestions have included: storing an identical replacement of a child as a precaution for parents who may fear losing their baby to cot death; producing a clone for spare part transplants or transfusions for those suffering from illnesses such as leukaemia; and reproducing

much loved relatives (as well as pets²²) (Dixon, 1997; Sayers 1997). The headless (frog) clone (powerful symbol of non-identity) is in this context held to signify the way for human organ factories where *parts* of human embryos are grown in order to 'bypass' ethical concerns and legal restrictions²³. Bodily frailty, physical decay, even mortality itself increasingly appear, as Victor Frankenstein put it, as but "ideal bounds" (Shelley, 1997: 30) which technoscience may in the fullness of time eradicate. It is the 'designer human' however that perhaps best exemplifies this "age of biological control". It suggests, as we have seen, the *inversion* of the relationship between nature and culture (Rabinow, 1996a). The bodies of the future, Haldane, Toffler et al intimate, will no longer reflect the genetic lottery but the ebb and flow of consumer choice and the inscription of the imperatives of social organisation: the ultimate conquest of *tyche* by *techne*.

As fantasies of self-creation, the 'designer baby' and the human clone thus usher a new era of ontological insecurity. When every barrier is (seen as about to be) breached and the apple of knowledge eaten to the core, it is not surprising that ambivalence about the new technologies is a persistent motif in discussions of scientific and technological work. Post-natural amplified bodies, for instance, represent the joyful opening of new possibilities, but at the same time generate effects of anxiety, disorientation and revulsion. The notorious 'yuk factor' can perhaps be seen as a reaction to the loss of 'aura' (variously conceived as personhood, dignity²⁴, autonomy etc.) which such projects are seen to facilitate - the new Prometheuses of modernity looking at their works and feeling sick. An essential tenet of the Frankenstein mythos - from Shelley's tale to *Jurassic Park* - is that moral and intellectual failure often accompanies technoscientific success.²⁵ The suspicion is that the promises of empowerment and renewal will be betrayed and that the forces unleashed are destined to escape any system set up to control them. The 'curse of Frankenstein' so to speak, can therefore be summed up as an enduring legacy of distrust of those same activities that attempt to render the world better suited to human needs, and more amenable to human desires, through the application of technoscientific knowledge. The inkling persists that it is not only the *sleep* of reason that begets monsters.

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¹ The non-human examples in this list figure because they were seen both to mark significant developments in their own right and more importantly, as far as the argument advanced here is concerned, are seen to herald important developments that might soon be realised in respect of humans.

² For related discussions of media representations of in vitro fertilisation (IVF) see: Franklin (1997); of embryo research see: Mulkay (1997: 69-82).

³ 'Nobel scientist warns of cloning peril', available at: www.netlink.de/gen/Zeitung/970225c.htm.

⁴ E.g. Jaenisch and Wilmot (2001); Gibbs (2001); *Daily Express* October 11, 2000: p.1.

⁵ At the time of writing, five births in all have been announced by the sect, while a 'second generation' of twenty more is said to be on its way (see: www.clonaid.com) The Raelians believe that bodily duplication through cloning is the route to immortality - as humans do not possess divine souls. They thus hope that "personalities and memories" can be uploaded "straight into this new body" (Rael cited in Preston, 2003: 2). "The worlds greatest UFO related organisation" claims 60000 adherents in 100 countries (see clonaid op. cit) and is named after their leader and founder Rael. The former Claude Vorilhon (a French motoring journalist) claims to be the brother of Jesus - a fact revealed to him by Yahweh in the course of an informal lunch with Christ, Mohammed and the Buddha on planet Elohim (Preston, 2003: 1) - and is destined to lead humanity into a blissful techno-utopian future (Alexander, 2001).

⁶ This type of argument was first formulated by Hans Jonas (1974: 159 ff).

⁷ As Rabinow contends, it isn't just the newness of technoscientific developments "that leaves us culturally unprepared" but also the "background assumptions and practices that lurk unexamined at the edges... that contextualize the technology and frame our questions and responses." (Rabinow, 1996b: 130) For Rabinow, these assumptions (in Western culture) include the "lingering residuum of Christian beliefs which hold the 'body' to be a sacred vessel".

⁸ Counter to the notion that (reproductive) cloning epitomises technological development gone awry, one academic writing in *The Daily Telegraph* opined: "Essentially, human cloning would be like producing rather a lot of twins, for clones would have exactly the same genetic identity as twins. No one thinks identical twins are uncanny or horrible. So what is the difference? Well, it would be hard to describe the relation of father to son or mother to daughter. The 'son' would be the twin of his 'father' and so on. But that is not an argument against cloning, merely an accurate description of what it is." Casey (2001). For Nathan Myhrvold former Microsoft CTO opposition to cloning amounts to "just another form of racism" since it discriminates against (potential?) "people based on another genetic trait - the fact that somebody already has an identical DNA sequence" (cited in Alexander, 2001).

⁹ See Van Dijck 2000. The fear of clone armies has also been voiced by, for instance the members of the Wellcome focus group members (1998) and notably, by the late Cardinal O'Connor of New York "You could just keep producing and say, 'They are expendable. Give 'em a gun and send 'em out'" (cited in Alexander, 20001).

¹⁰ Similar arguments have been made concerning the distinction between therapeutic and reproductive cloning.

¹¹ The procedure involved siphoning off the latter's unejaculated sperm and using it to fertilise the egg of a surrogate (Gibbs, 2001).

¹² "It is the right of every American citizen to have a child ... Let us show the proper compassion for those suffering American infertile couples. Let us give them some hope and let us not turn our backs on them. They deserve something better than that", testimony before the House Subcommittee on Criminal Justice, Drug Policy, and Human Resources by Panos Zavos (2002: 2-3), another would-be-cloner and former Antinori associate.

¹³ A number of observers (*e.g.* Fox 1992; Lambert, 1992; Melhuus, 1992) have been intrigued by a perceived paradox; namely that public debate over the new developments in reproductive technology had the apparent effect of subverting their radical social potential by re-contextualising them as essentially dedicated to the assistance of the nuclear heterosexual family. From the point of view adopted here, the operation of the model of the nuclear family as a sort of discursive *a priori* in the repertoire of exponents, appears less paradoxical given the perceived need of proponents to defuse the status of these technologies as potential sources of destabilisation and anomaly. In other words, the concept of the nuclear family functioned as a sort of 'container', a means of normalising the otherness of technology (*cf.* Schneider, 1992; for a discussion of the topic see: Mulkay, 1994).

¹⁴ It is reported that of the other embryos one tested positive for the disease and was destroyed while the remaining ones were frozen (*The Guardian*, October 20, 2000).

¹⁵ In another case, parents of four boys who had suffered the loss of their only daughter requested the use of IVF and embryo selection in order to guarantee the birth of a new daughter. Their application was refused by the Human Fertilisation and Embryology Authority.

¹⁶ On the basis that the genetic cause of his disorder has not yet been identified so the pre-implantation genetic diagnosis would be used solely to ensure a tissue match – not to prevent a genetic defect from being passed on (cited in the *Daily Mail* 2 August, 2002: 1).

¹⁷ Society for the Protection of Unborn Children.

¹⁸ Donald MacKenzie (1992) for instance, has suggested that technological trajectories rather than being the unfolding of an intrinsic disembodied techno-logic, are best viewed as the institutionalisation of particular sets of (self-fulfilling) cultural expectations. See also Fleck (1979: 33).

¹⁹ This point deserves some comment. Clearly the Minotaur was only one among the many hybrid creatures which populated the mythological landscape. What made him unique however was that unlike them he was a human creation and thus not part of the normal ‘furniture of the world’. Not dissimilarly, the dinosaurs in Conan Doyle’s *Lost World*, are discovered in a remote Amazon location. In *Jurassic Park* however, the Crichton – Spielberg re-telling of this tale, the dinosaurs are, so to speak, post-natural the intentional products of genetic engineering (Strathern, 1992a; Franklin, 2000). Similarly, in the story “chaos theory” has taken on the role previously performed by divine disapproval.

²⁰ Indeed, Turney cites examples from the media dating back to the early part of the Twentieth Century.

²¹ This is not however to deny the thread of ambivalence sustained throughout the novel which stems from the attraction of social order that science and technology seemingly make possible.

²² See for instance www.missiplicity.com.

²³ See for instance ‘Grow-Your-Own alternatives may solve dilemma’ (Highfield, 1998: 6).

²⁴ As for instance, in the UN’s declaration of reproductive cloning as contrary to “human dignity”.

²⁵ Margaret Atwood’s (2003) *Oryx and Crake* is the most recent contribution to this mythos. The narrative is populated by various laboratory created hybrids such as “woolvogs”, “pigoons” and “rakunks” – scientific experiments gone awry and rebounding on their creators.