The premature arrival of the future: clones and genetic engineering around 1973

Christina Brandt¹ (RUB)

1. The cloning of John F. Kennedy

In November 1973, the US public expected an event that was deeply concerned with the past. The nation was looking forward to an occasion, devoted to the memory of a past tragedy: On November, the 22nd, the 10th anniversary of the assassination of John F. Kennedy was widely celebrated in the country. Did already the murder of John F. Kennedy cast a cloud over the atmosphere of political changes that was so typical for the early 1960s, disillusioned theories of conspiracies had become established ten years later. In 1973, on time with the 10th anniversary, new novels, films and stories were published that nourished views of a political, military and industrial complot responsible for the murder. “Executive Action”, for example, was a well-known movie that became a highly controversial issue in the US. Coming to the cinemas timely in November of that year, the film captured the audience in the disillusionment of a negative world in which corrupt politicians and racist industrialists who wanted to control the nation were the hidden power behind the assassination.¹ Already in October 1973, another but less known fictional story about Kennedy’s assassination was published: “Joshua, Son of None”, written by the science fiction author Nancy Freedman, also promoted views of conspiracies of the political

¹Executive Action, directed by David Miller, 7 November 1973 (USA).

powerful. However, in comparison to “Executive Action”, we find an important difference: Whereas the movie, although fictional, was a deeply political one and claimed to give true interpretation of the past events, the framework of Freedman’s novel shifted from a political to a scientific one. The novel re-configured the assassination of J. F. Kennedy within a bio scientific context, hybridizing past history with future technologies. It turned the factual political events into a fictional story that celebrates the resurrection of the murdered president, made possible by new biotechnologies: “Joshua, Son of none” is one of the first novels in the 1970s that took up scientific developments in cloning research and related ideas of human cloning. The novel treats the present as an iteration of the past, and, at the same time, as atemporal assemblage of present technologies and yet undreamed biotechnological possibilities of the future. The plot is told as quickly as it is simple: After the assassination of John F. Kennedy, a group of true followers had congregated to produce a biological clone from a cell of the murdered president. While the president’s double (called Joshua Francis Kellog) grew up, the group of politicians and other influential men of business tried to simulate all conditions of its predecessor’s development and social education, down to the smallest detail in social family structure. JFK II actually rises to a successful politician and became one of the most popular presidential candidates of the United States - until it became publicly known that he is a clone. During an election campaign in Dallas – this is supposed to be the punch line of the story - he is shot by a fanatical anti-cloning-demonstrator.

It is, of course, a historical coincidence that one of the first scientific articles on modern bio-technologies that immediately was regarded as heralding a new technological revolution in modern life sciences was also published in November 1973:In the issue of the prestigious Proceedings of the National Academy of Sciences of the United States (PNAS) from that month, Stanley Cohen and Annie Chang from the Stanford University school of Medicine and Herbert Boyer and Robert Helling from the University of California at San Francisco announced the first successful “Construction of Biologically Functional Bacterial Plasmids in vitro”. For the first time, scientists had created a bacterial plasmid in the test tube. Moreover, they had demonstrated that it was possible to insert foreign pieces of DNA

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into this artificially created string of bacterial nucleic acid. The PNAS article announced no
less than the birth of “gene cloning”, a technique that basically relied on the use of
artificially created plasmids as so-called “vectors” to insert specific foreign pieces of DNA
into E.coli bacteria. Through this procedure it became not only possible to create transgenic
bacteria. Moreover, by using the naturally given rapid multiplication of E.coli this technique
enabled the scientists to mass-reproduce whatever kinds of genes were inserted into the
bacterial genome. This procedure, which very soon became called “gene cloning”, was
basically the “founding technique” of the new field of recombinant DNA research. The
creation of a transgenic bacterium in the year 1973 marks the symbolic beginning of a new
technological era in the life sciences: the era of genetic engineering. It opened up a
completely new horizon of future possibilities of industrial, pharmaceutical and a wide
range of other applications of gene technologies. These new technologies supported a deep
change of the institutional and economic research landscape, since they rapidly foster the
new foundation of biotech companies in the late 1970s and early 1980s. In almost all
Western countries, these processes were accompanied by a first public and extensive
debate about ethical issues and social responsibilities of a modern biology that had turned
into an engineering technology with the power to irreversibly change nature in so far undreamed ways.⁴

What have the public discussion of the 10th anniversary of the assassination of John F.
Kennedy, the publication of one of the first clone novels written by a science fiction author,
and the beginning of the recombinant DNA research in common? Is there something more
that relates to these events than the historical coincidence that they all took place in the
year 1973?

To describe the early 1970s as a watershed in the history of life sciences – and to trace
this shift symbolically to the years 1972/ 1973 and the origin of recombinant DNA
technologies – is certainly not a new insight in history of science.⁵ However, what interests
me in the following is to understand the fundamental shifts in modern life sciences that
arose with cloning techniques and gene technologies (and the related debates on science
and society) against a broader cultural background in the early 1970s. How can we

⁴See, for example, Susan Wright: Molecular Politics. Developing American and British Regulatory Policy for Genetic
Engineering, 1972-1982; and Herbert Gottweis: Governing molecules: the discursive politics of genetic engineering in Europe
⁵See, for example, James Watson, J. Tooze: The DNA Story. A Documentary History of Gene Cloning, San Francisco 1981
historically understand this period from the 1960s to the 1970s regarding questions about continuities and discontinuities of postwar discourses on science and society? In contemporary history, voices are being raised to understand this period as a break that distinguishes the 1970s from a long period of postwar culture, at least regarding developments in global economics, in political, social and cultural history. The question that remains, however, is, how to understand the early 1970s developments in science and (bio-)technologies against this broader context of changes? The early 1970s were indeed a period of fundamental transitions in a variety of fields: Political and economical crisis (such as the “Watergate” scandal in 1972/1973 or the first oil crisis in 1973) shaped a social atmosphere of disillusionment not only in the US. The increasing public awareness of ecological problems as well as of the limitedness of natural resources (the latter in the wake of the Club of Rome analysis on “The Limits to Growth” (published in 1972) fostered not only a skeptical look at the modern conditions of industrialized Western societies but nourished also extreme fears for (and fears of) the future. By using cybernetic models of calculations, the Club of Rome report portrayed in very statistical detail and very drastically gloomy prospects about global population growth, environmental damages and the future shortage of economically necessary natural resources. It was immediately read in Western countries as a shocking signal, nourishing apocalyptic scenario of future economic and ecological conditions for mankind.

A turn from the “revolutionary 1960s” towards a period of a kind of disenchantment in the early 1970s, became also apparent in the popular discussions about social consequences of the modern life sciences. Comparable to political and socio-economical discourses in the 1960s, the discussions about social utilities of the modern biology (- a discussion that had started already in the 1960s when the new scientific field of a “molecular biology” celebrated the breaking of one of the most fundamental riddles of life, namely the “genetic

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code” in 1966) were characterized by visionary scenarios full of prospects of scientific and societal progress. With their unbounded prospects of the technological possibilities and the future advantages of life sciences, these vision that were propagated by some influential molecular biologists and geneticist during the 1960s referred to a future world that was regarded as a distant horizon, full of high expectations about how science will reshape mankind and society. Whereas futuristic visions predominated the debates in the 1960s (as will described with respect to the discussion about human cloning in more detail below), the 1970s discourse focused on the more or less realistic advent of a biotechnological era. The emerging debates about the risks of recombinant DNA technologies turned utopian views into dystopian scenarios, challenging longstanding cultural ideas about a scientific “progress” that moves forward into the same direction as social – or even moral – “progress”.

A common feature that appears in political, economical and social discourses in the early 1970s - as diverse they were - might be framed as “the loss of utopia as the referential time and action-paradigm for political thought”, as Pedro Chagas has emphasized.⁸ Such different incidents of the year 1973 as the 10th anniversary of JF Kennedy (and the related pessimistic views of political conspiracies endangering democracy), the beginning of recombinant DNA research (and the related public controversies about the very notion of “scientific progress”), and the publication of one of the first novels about human cloning that turned cloning already into a (fictional) reality, all contributed to an “unclear feeling that a shift in Modernity was taking place”.⁹ With their pessimistic overtone they were typical for the self-understanding of those years, but they can also be taken as indications of a more fundamental change. Of course, we find several historical moments of crisis and dystopian movements during the 20th century, one even could argue that the very notion of “modernity” refers to crisis ridden conditions. However, the decade of the 1970s, was a period of transitions where not only a social feeling of disenchantment and economic disillusionments get ground in variety of areas - but where this widespread mood of crisis seemed also to have a lasting effect on how Western societies thought about future developments and future prospects. Doubts about scientific and technological “progress”

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⁹Ibid.

were, of course, already raised in earlier decades (if we think only about the controversies about nuclear power and the atomic bomb in postwar period), however, in the 1970s these doubts became extremely widespread in the public field. They were embedded in new discursive constellations of temporalities that deeply affected how the category of the “future” was perceived. An awareness of an increasing temporal acceleration brought the advent of the future closer to the present state. In my view there are good reasons to argue that, in a historically new extent, this future-oriented 1970s-discourse reacted to contingencies and uncertainties by trying to replace the openness of the future by approaches of prediction, prognosis and by a gesture of a prevention.

In his analysis of the emerging futurology or “future studies” in the 1960s and 1970s, Alexander Schmidt-Gernig has argued that, in contrast to older, more or less teleological approaches of the 19th and 20th century, the characteristics of the new future studies were their empirical, scientific and cybernetic basis. The attempt was not to predict the future with respect to “historical laws” (as it was common in 19th and early 20th century approaches such as utopian attempts or philosophies of history by Comte, Marx, Spencer or Spengler) but to get to “models of the future” by empirically collected and calculated data of the present. However, from this calculating attempt towards the future it was expected that it could help to steer development in a desirable direction. As Schmidt-Gernig shows, the new “future studies” and the new futurology was a transnational phenomenon that became institutionalized already since the early 1960s, but it was not until the late 1960s and early 1970s that a massive wave of organization, think tanks and publications devoted to research on the future became established. During this period (and with a peak in 1970 and 1972), each year 80 to 120 books were published, that were dealing with problems and research on the future.

However, these massive transnational concerns with the future, lead to the almost paradoxical situation that the very basic notion of a “future” was disappearing, since it became integrated into present realities. In this article, I trace these shifts in Modernity by focusing on one element in the discussion about science and technology, namely the public.

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12 And these numbers refer only to English publication. See ibid., p. 397.

debates about human cloning. My thesis is that 1970s debates about cloning contributed to a broader shift in social categories of temporalities and new ways of perceiving temporal processes. The popular figure of the human clone became a symbol for the advent of the (technological) future and, with that, a symbol for a collapse of a specific kind of historical time. The 1970s discussions about science, technology and society raised the question how one could already prevent or steer future consequences of research in advance, that is, before they will lead to dangerous facts and before they could turn into new, “irreversible” realities. With the idea that it should be politically important, at the present moment, to try to steer outcomes in a specific direction, that is: in a period in which these future results are still in the process of being made, the concept of an “open horizon” or “open” future became replaced by notions of a projectable future: a future that was regarded as something which can, at least to a certain extent, be “created” (or be controlled with respect to technological risks) already in present days, and that, therefore, was now regarded as something that starts already in the present. With that the “present has suddenly become wider than merely the thin layer that used to separate the past (that is always being rapidly left behind) and the future (towards which societies are always accelerating”33 as Pedro D. Chagas has emphasized a characteristic element of the early 1970s cultures. The clone – as a popular figure in media, science fiction and public discourses – represented this process of “defuturization” in the 1970s in a twofold sense: First, the clone (as a kind of a-historical figure, with its meanings of a repetition of sameness and as something that is exempt from historical changes) turned into a widespread symbol for this extension of the present and the crumbling of a linear temporal model of progress. On a very basic level, the clone became a post-modern symbol for the breakdown of historicisms in a general sense, where “time” lost its historical quality or its “historical force”. Secondly, some science fiction novels picked up the motif of cloning man and draw dystopian scenarios of future conditions of mankind. In these apocalyptic scenarios, the clone also represents the end of history, but in a slightly different sense: Here, the figure of the clone became a motif for a post-historical situation, since it was used to show that (due to an ecological collapse of the world), the end of history and the end of mankind as we know it was a threatening close-by reality.

Before these developments will be discussed in more detail in the following parts of this article, the next section will first make a few general (historiographical) remarks about shifts of concepts of temporalities.

2. Shifting concepts of temporalities: the “otherness of the future” and “anticipatory regimes”

At latest since the Enlightenment, the relationship between the past and the future became regarded as contingent. It is a common feature of Western societies to distinguish past (historical) experiences and future expectations and to have a strong idea of ‘progress’ – as an open future, towards present societies accelerate. The historian Reinhart Koselleck has described these shifts of temporal concepts around 1800 in detail. Arguing that the “rupture in continuity” was a “generalized topoi of that time”, he emphasized that the emergence of the “progressive future was also accompanied by a change in the historical valency of the past.” In pre-modern periods the two central categories that, following Koselleck, are constitutive for how we perceive “history”, namely the categories of “experience” and “expectation”, were closely tied. Still 17th scholars believed that “all histories resemble each other or [were] structurally similar” why it was “possible to learn from them in future”. Whereas this notion of history was a uniform and static one, we find a shift towards a historical time in the late 18th century Europe:

Time is no longer simply the medium in which all histories take place. It gains a historical quality. Consequently, history no longer occurs in, but through time. Time becomes a dynamic and historical force in its own right. (KOSELLECK, 2004a, p. 236)

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15 Reinhart Koselleck: “Spaces of Experience” and “Horizon of Expectation”: Two Historical Categories”; in: Koselleck, Futures Past, p. 268.
16 Ibid., p. 268.

Around 1800, the space of past experiences and a horizon of expectations diverged, and new concepts of temporalization emerged, as “it became a rule that all previous experience might not count against the possible otherness of the future”.\(^\text{18}\) These Enlightenment ideas of a historical time - as a dynamic force in its own right - and the notion of the “otherness of the future” are central to understand how ideas of political and social “progress” became deeply intertwined with ideas of scientific and techno-industrial progress in European societies since the late 18th century.

It became a general empirical principle of scientific invention and its industrial application that they gave rise to an expectation of progress that could not be calculated in advance. A future not inferable from experiences release all the same the certainty of an expectation that scientific inventions and discoveries would bring about a new world. Science and technology have stabilized progress as a temporally progressive difference between experience and expectation. (KOSELLECK, 2004b, p.269)

Whereas Koselleck has argued that the 19th century techno-industrial culture had nourished Enlightenment ideas of the “otherness of the future”, of “progress” as a space of difference between an elapsed past and an open future which also includes a discourse operating along the awareness of surprises, unforeseeable possibilities, uncertainties and utopian expectations, recent scholars in science studies have emphasized a quite different, even opposite effect that contemporary techno-sciences and bio-economies unfold today: Vicanne Adams, Michelle Murphy and Adele Clarke speak about “regimes of anticipation” as a new way of perceiving time and of acting within temporal regimes in recent societies.\(^\text{19}\)

**Anticipation** is more than a speculative forecast: “Anticipatory modes enable the production of possible futures that are *lived and felt* as inevitable in the present, rendering hope and fears as important political vectors”.\(^\text{20}\) Being both - an epistemological model and moral economy -, the contemporary “regime of anticipation” is very much driven by global socio-economic developments of capitalism and recent biotechnologies and biopolitics (with their needs for predictions and promises of optimization the human body). As a way of “management of the future”,\(^\text{21}\) anticipation is, as Adams, Murphy and Clarke write:

\(^{19}\)Vincanne Adams, Michelle Murphy, Adele Clarke, „Anticipation: Technoscience, life, affect, temporality“, *Subjectivity* 28 (2009), p. 247.
\(^{20}\)Ibid., p. 248.
\(^{21}\)Ibid., p. 253.
a lived conditions or orientation, [that]gives speculation the authority to act in the present. Anticipatory regimes offer a future that may or may not arrive, is always uncertain and yet is necessarily coming and so therefore always demanding a response. (…). Anticipation is not just betting on the future; it is a moral economy in which the future sets the conditions of possibility for action in the present, in which the future is inhabited in the present. Through anticipation, the future arrives as already formed in the present, as if the emergency has already happened. (ADAMS, MURPHY, CLARKE, 2009, p.249)

How can we, from a historical point of view, understand these shifts from the “otherness of the future” to regimes of anticipation in discourses on temporalities? And how can we historically understand the role, science and technology, in particular, a new kind of technologies of the living, played in these processes?

The "otherness of the future" as well as and notions of “history” as based on a kind of linear model of temporal developments running from a past period over a present state towards an unknown future (each of them regarded as distinguished, although interrelated time horizons, that also serve as fields of projections for each other), have been problematized already since the last decades of the 20th century. Not only theorists of “postmodernity” questioned this enlightenment notions of “progress” and the related ideas of a “historicism” in the 1970s and 1980s. Also sociologists analyzed shifting temporal concepts in late 20th century Western societies. Helga Nowotny, for example, has argued that the perception of a linear (“historical”) time in Western Societies has dramatically changed at the end of the 20th century because of developments of information technologies that support visions of simultaneity. The concept of an open future that is viewed as something distinct to the present is, following Nowotny, replaced by a socially experienced extension of the present. The notion of “progress” basically implied the idea of the future as a distant horizon, as a realm of projections towards the present is moving forward but that is, as an “open” future, as such never reachable. However, the perception of future times as an extension of the present, turned in contrast, as Nowotny argues, the future conditions into something that is regarded as being controllable and predictable at least to some extend already in the present. Since the result of this kind of an anticipational

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22It would be very interesting, to discuss Baudrillards notion of ‘Hypertelie’ in the context of the emerging 1970s discourse about the clone as a re-iteration and a collapse of a historical time.

approach towards the future can be understood as the extension of (an everlasting) present, Nowotny called this new temporal regime the “extended present” (erstreckte Gegenwart) in 1989.\textsuperscript{24} Quite similar, Niklas Luhmann described a process of defuturization already in the mid-1970s. In articles from 1975 respectively 1976, Luhman differentiates two distinct models of perceiving temporalities in Western societies: the “present future” versus “future presents”.\textsuperscript{25} He wrote in 1975,

The prevailing conception of the present future seems to be a utopian one, with an optimistic or pessimistic overtone. The future serves as a projection screen for hopes and fears. Its utopian formulation warrants rational behavior toward different (predictable and unpredictable) future presents, at least in the form of coherent negation. (…) This is the future that cannot begin. It remains a present future and at least an infallible sign of the presence of critics. It moves away if we try to approach it. (LUHMAN, 1976, p.143)

In contrast to that, “future presents” are characterized by Luhman as results of the power of technologies that shape specific discourses:

Technologies, on the other hand, orient themselves to future presents. They transform them into a string of anticipated presents. They postulate and anticipate causal or stochastic links between future events in order to incorporate them into the present present. (…) A future defuturized by technology can be used as a feigned present from which we choose our present present to make it a possible past for future presents. (Ibid, pp.143-144).

From a historical perspective it is interesting to read Luhmann’s statement as a contemporary analysis of the 1970s to be a “watershed” that marks a slow ending of the postwar period. What Luhmann described as the “future- incorporating power” of technologies, which have the tendency to turn future horizons into a “string of anticipated present”\textsuperscript{26} can historically be understood as a massive discursive shift going on in the late 1960s and early 1970s, being an early symptom of a since then ongoing movement in Western politics of temporalities, nowadays are probably best described as “regimes of

\textsuperscript{24}Ibid., p. 47-76.
\textsuperscript{26}Ibid.
The incipient spreading of such “regimes of anticipation” can be seen very clearly if we look into the field of popular science books at the turn to the 1970s. Already the titles of such bestselling books as “The biological time bomb” (1968) by the British science journalist Gordon Rattray Taylor or “Future Shock” (1970) by the US futurist Alvin Toffler clearly indicate the massive concern with the future. Both books were leading the non-fictional bestseller lists for months in the US and Western countries. They were heralding a new revolution in science and technologies that would change future societies in yet unknown extents. Whereas the “Biological Time Bomb” focused on developments in life sciences – such as research on reproductive medicine, brain research, the creation of artificial life, or genetics and cloning research, Toffler “Future Shock” is a devastating blow addressing fundamentally technological as well as socio-economic innovations of a time that was described by him as a fundamental break in the history of mankind, even hardly comparable to a second industrial revolution. Toffler discussed a variety of fields, ranging from information technologies, cybernetics and a new man-machine symbiosis, over future manipulation of the human body, a revolutionary new management of work in what he called “superindustrial societies”, or the dissolution of traditional family values in a socioeconomic world that bring about a new nomadic life of the citizen of the future (to name only a few fields). He also very clearly envisioned a process of psychologism of societies and a turn from industrial societies to new kinds of pleasure industries, based on virtual simulations and artificial environments. Describing technological and economical innovations that are too rapid for recent societies to follow, Toffler’s book was widely received as being both an enthusiastic plea for a new revolutionary time full of never before experienced radical changes bringing the “superindustrial society” as well as an appeal to control the speed of these innovations. It was read as a warning about the consequences of an acceleration of technological progress that lead to collective diseases such as depression or fear of the future and an increase of violence, and it was read as an appeal that recent societies have to be prepared to face these future challenges if they want to avoid that people suffer from the consequences. A sentence of Orson Welles probably best described...
the book’s message: In a TV documentary from 1972 that was based on Toffler’s book, Orson Welles (having the role of a narrator who leads the viewer through different fields of the new realities) explained drastically in the beginning sequences of the movie: “Future shock: (...) is the premature arrival of the future”.

3. Concepts of temporalities in the first debates on cloning and genetic engineering in the 1970s

It is still a challenging task for historians of modern life science, to understand the emerging gene and cloning technologies against this broader cultural background of shifting social perceptions of temporalities, since the 1970s debates on biotechnologies can be regarded as both: as a mirror and as a driving force of a broader and changing discourse of “defuturization” of societies. Whereas the 1960s debates about the “new biology” were inspired by the futurism of cybernetics and they were characterized by optimistic and visionary scenarios about the social utility of modern science and technologies, the discussion turned into a controversy on “technological risks” in the 1970s. The 1960s utopian scenarios of science and society referred to a future that was regarded as a distant horizon of future expectations. During this decade, when molecular biology as a new scientific discipline became institutionalized at universities and research centers, the vague silhouette of a future biology and its prospective impact on transforming mankind were main topics of the new scientific community of molecular biologists. The future goals and social applications of genetic possibilities that were discussed by some scientists were indeed very futuristic. They easily met prophetic visions of future worlds or societies, in which societal progress is fundamentally shaped by technological progress. Among these utopian views the possibility to clone human beings and to transcend human evolution in future times were prominent ones. Eugenic views of the clonal creation of superior human beings were propagated by scientists such as the Nobel laureates Herman J. Muller who regarded cloning methods, similar to artificial insemination, as future key technologies in human


reproduction aiming at a socialist betterment of society, and Joshua Lederberg who envisioned a future clonal reproduction of man as “interesting exercise in social science fiction”. He also discussed a variety of other future possibilities of cloning, such as the creation of human clone twins who would be able to reach a new level of communication skills due to the similarities of their neurological systems. A central aspect of the 1960s views on human cloning was the transgression of boundaries: a technological transformation of human nature and a transgression of time limits that turned the future horizon into a projection screen full of visionary, prophetic imageries. At the well-known CIBA foundation symposium “The future of man” that took place in London in 1962, J.B. S. Haldane, another scientist who was influential in setting up popular ideas of cloning man, discussed intervening technologies of the new life sciences, as “biological possibilities for the human species in the next ten thousand years”. The CIBA symposium provoked a first wave of protests against apparently eugenic approaches of some of the outstanding scientists of the modern life sciences. However, a critical consideration of the future prospects of the new life sciences by the public was still restrained at that time. This changed completely during the 1970s. After the scientific results of “gene cloning” in 1973 (which I have mentioned in the beginning), and the developments in reproductive medicine, the public more and more became concerned with possible (future) aftermaths of bioscientific research.

Soon after the first results of gene cloning were published in PNAS in November 1973, the molecular biologist Paul Berg initiated a moratorium on recombinant DNA technologies. In 1974, he and other scientists of the field drafted a letter calling upon “scientists throughout the world” to “voluntarily deferring” specific types of experiments. The aim of their letter was to suspend certain types of studies until the risks of these research directions, in particular, the hazards of those attempts that could affect the human being directly (e.g. approaches to insert DNA material from oncogenic viruses into E.coli).

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could be assessed. This request for a moratorium eventually led to the organization of a meeting that took place at the Asilomar conference center in California in February 1975.\(^{36}\) Around 150 molecular biologists and an exclusive group of lawyers and journalists gathered for discussing concerns about the safety and risks of the newly emerging gene technologies. “Asilomar” then became a catchword for an entire generation of molecular biologists, expressing a self-understanding of ethical responsibility not to repeat the failures of their colleagues in the field of atomic physics some decades ago. Rather, the aim was to anticipate in advance possible negative consequences of scientific research. From a historical perspective, Asilomar can be regarded as a trigger for the so called “recombinant DNA debate”: This debate started as a discussion among scientists on how they themselves (more or less without participation of non-experts) could develop voluntary self-regulatory practices allowing a control of the risks of research. However, soon the public demanded an extended debate about the new biology, including a variety of actors from law, politics, and the public and calling for more complex regulatory science policies.\(^{37}\)

The 1970s discussion became not only a highly controversial one in which dystopian views concerning social and ethical consequences of almost all big technologies (atomic energy and emerging biotechnologies) or technologies affecting the human being (reproductive medicine) get ground in the public discussion. Moreover, with the turn to the 1970s we have a period of transition in which a techno-scientific discourse on futuristic prophecies (typical for the 1960s) turned into a public discourse of prognosis and prevention. The idea of the possibility to calculate what now became called “risks” that technologies will have in future times, as well as the critical political demands to regulate scientific “progress” in order to control future developments in science and technology were two sides of the same coin: a shifting discourse towards the view of a political responsibility to “take care for the future”, which implies the assumption that it might be possible to “predict”, to anticipate or even to “control” future developments already in the present.

It is against this historical background of an arising controversy about the scientific and technological premise of “progress”, that we have to understand the changes in how


the figure of the “human clone” was discussed in the public field. The “clone” became now a popular symbol for these processes of “defuturization”. It was not seen anymore as a (utopian or dystopian) figure of a distant future, but something that had become a close-by reality already in the present of the 1970s (- although, as well all know, no human being has been cloned until today). In the 1970s we find the first widespread debate on cloning that encompasses much more than scientific aspects: cloning was suddenly a popular theme in science fiction novels and narrations. The folding of future and present, and the related facticity of future human cloning, became plainly expressed by 1970s-movies on cloning: For the well-known clone movies of that time – “The Resurrection of Zachary Wheeler” (1971), “Boys from Brazil” (1978) and “The Clonus Horror” (1979) – it is a typical feature that their stories are explicitly situated in the familiar present days of the US or West European countries, unsettling the spectator about present facts and future fiction.38 In a similar vein, the yellow press seriously announced the cloning of Elvis Presley39 or Bob Dylan.40 And towards the end of the decade, we find a widely discussed media hoax about the first successful human cloning experiment, taking the blending of future and present to an extreme. In 1978 the science journalist David Rorvik published a simulated documentary report about the first successful cloning experiment of a human being. “In his Image, The Cloning of a Man” was published as non-fictional book in March 1978, and it immediately entered the non-fictional bestseller list of the New York Times.41 The renowned publishing house (Lippincott) announced the book in February as the “scientific investigative report of the century”. Under the heading “A human baby created in a laboratory is now 14 months old”, the advertisement of the book in Publishers Weekly in February 1978 sensationaly says: “Given recent breakthroughs in genetics it was inevitable. Sooner or later the necessary funds and expertise and a determined sponsor would be brought together – and David Rorvik, because of his prize-winning science reporting, was the chosen

38 “The Resurrection of Zachary Wheeler”, directed by Bob Wynn, November 1971 (USA); “The Boys from Brazil”; directed by Franklin J. Schaffer (based on a novel by Ira Levin), 1978 (UK/USA); “The Clonus Horror”, directed by Robert S. Fiveson, 1979 (USA).
intermediary”.\textsuperscript{42} Rorvik, a well-known science journalist who had published popular science books before, claimed in this book that he had helped a US west coast millionaire to find scientists and physicians that were successful in producing a clone of him through cell nuclear transplantation techniques. Playing on words, the author himself referred to a “preview” (instead of a review) in the epilogue to the book, leaving the reader in the undecided situation how to understand his narration: as a documentary of factual events of the present days or as a trailer of a future towards which we are inevitable heading for. As a response to what became named the “Rorvik scandal” during 1978, also a lot of scientists argued that it would only be a matter of time until the first truly cloning of a human being will be announced to the public. This discussion was in no case restricted to the US: The German popular science journal \textit{Bild der Wissenschaft}, for example, stated in 1979 that Rorvik had written a science fiction novel respectively a novel of the future (“Zukunftsroman”), but a definitely scientific one: “Cloning of human beings may not be possible today, but this is only a matter of time. (...) Thus, it is not considered to be premature to think early enough about the consequences.”\textsuperscript{43}

The 1970s popular images of cloning were full of views of “immortality”, of artificially created man, and of simultaneity of sameness: the clone was depicted as the result of a desire of an endless life, as something, that is best characterized as a repetition of identities, as recurrence or - with biblical connotations - as “resurrection”. With that, the clone is an element of very longstanding mythological, cultural or literary motifs, such as ideas of the doubles, of Golems or other artificial human creatures. However, from a history of science perspective it is interesting to note, that the clone images that circulated in the public discourse, in particular the technological connotations, also belonged to an “older” semantic field of the scientific term, since they rested on meanings that had originated in the first half of the 20th century in the “pure line” approach in biology. Ideas of “serial mass reproduction”, “purity”, and “identity” were already the dominant meanings of the clone concept in plant breeding and hereditary research where the term “clone” was original


\textsuperscript{43}”Das Klonen von Menschen (...) mag heute noch nicht möglich sein. Aber dies ist lediglich eine Frage der Zeit. (...) Es ist daher nicht verfrüht, sich rechtzeitig über die Konsequenzen Gedanken zu machen.” (\textit{Bild der Wissenschaft}, Juli 1979, p. 34).

coined in the first decade of the 20th century. As the return of the same and as something that represents purity, the scientific concept basically implied the idea that the clone was exempt from evolutionary variations or from (temporal) processes of changes: the clones of plants or cells in early 20th century biology were regarded as something that were not affected from processes of selection. In this respect, the clone symbolized the antithesis to difference and variation, to changes over time, or, more broadly: to historical processes in general. These “older” scientific meanings of the clone as standardized entity, as a circular reiteration and as reproduction of pure “identities” shaped also the public discourse in the 1970s. With its underlying a-historical concept, the figure of the clone fitted very well into the early 1970s discursive tendencies of the mangle of present and future, the collapse of historicity, and the process of “defuturization” and even enforced them.

Implicitly, and sometimes even explicitly, the possibility of human cloning that occurred at a close-by research horizon was now discussed as something that points to the end of time—or the end of history. The philosopher and essayist Günther Anders, who was one of the first philosophers who discussed cloning and genetic engineering in a philosophical context, addressed this issue very clearly—and very early. In the introduction of his second volume of his major work “Die Antiquiertheit des Menschen”, written in 1979, he discussed cloning as a new symptom of a modern science that had turned life into technology. Ander’s anthropological approach to a philosophy of technology was probably the most obvious expression of how the modern developments in technologies were perceived as challenging not only our ideas of what it means to be human but, most of all, our concepts of a historical time. His strong emphasis that history had come to an end clearly expresses the loss of utopia as a way of framing time. Following Anders, present societies were not anymore understandable in a teleological time frame, as a historical phase of a utopian “not-yet” that had guided political and philosophical thinking for such a long time. Instead, he saw the present time as the last time, understanding the present

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44 The term ‘clone’ was introduced to refer to those plants that were propagated by any form of asexual reproduction and which descendants, therefore, were “simply regarded as the same individual”. (Herbert J. Webber: „New Horticultural and Agricultural Terms“, Science 18(1903), p. 501-503.) At that time also the a-temporal or in some sense a-historical structure of the clone was discussed in the scientific field with respect to evolutionary processes.

period as a time limit, as a “just-still” existing (Gerade-noch-sein) of mankind.\textsuperscript{46} Anders analyzed modern societies as being in a post-historical situation, characterized by a loss of the human subject as an actor in history. He critically regarded Western civilization as being in a stage of a “third industrial revolution”, in which humans as historical actors were replaced by technologies. As a result, Western civilization are in a historical phase of transition either towards a Zeitenende (the apocalyptic end of time in the case, mankind will destroy themselves and the earth through nuclear weapons) or towards the Endzeit, the “end of history” (the latter in the sense of the “last days of a human world“ when technologies will shape a forever lasting situation in which humans have no spaces for historical changes anymore).\textsuperscript{47} Anders argued that technology has definitely become “the subject of history, to which we ourselves are only co-historical”,\textsuperscript{48} or a by-product. The figure of the “human clone” was critically discussed by him as a symbol representing this power of technologies, which, for the first time in mankind, turn not only the (changeable) bodily nature of the human being into a commodifiable resource but that also causes the end of mankind and, hence, the end of history.

4. Apocalyptic and post-historical clone fiction in the 1970s

This breakdown of historicism or of a “historical time” became especially mirrored in literary novels on cloning. Creating possible worlds, literary fiction provided an imaginary space in which the consequences of new scientific technologies on human beings could be acted out. The focus was on the future fate of mankind and humanity when both are inevitable bound up with technological progress. In the above mentioned novel “Joshua, Son of None” we already saw the collapse of the “otherness of the future” and of “history” as a force of its own. Using the motif of cloning, the novel depicted the past (in this case: the

\begin{itemize}
\item See ibid., p. 10.
\item Ibid., p. 9. „In dem „Technik“ genannten Weltzustand spiele sich nun die Geschichte ab, bzw. die Technik ist nun zum Subjekt der Geschichte geworden, mit der wir nur noch „mitgeschichtlich“ sind."
\end{itemize}

murder of John F. Kennedy) as a kind of more or less static template for producing a certain kind of future that became a repetition of past events. The temporal dimensions of the novel might be described as hybrid: Remixing past and present with – not yet existing – technologies of the future, the novel raised the question whether cloning (which in a lot of public fields contemporaneously was discussed as a determining and de-humanizing technology of the future) would really have the power to fundamentally challenge our notion of what makes the essence of the human condition.

In addition to the more or less psychological approach of the cloning theme in Freedman’s novel, two other science fiction stories from the 1970s are especially worth pointing out: Kate Wilhelm’s “Where Late the Sweet Birds Sang” (1976), in which an ecological disaster leads to the formation of a clone society, and Naomi Mitchison’s “Solution Three” (1975). In both novels the cloning motif is intertwined with themes that are typical for the 1970s debates, such as the global destruction of nature and natural resources, overpopulation and war. With their discussions about the relationship between nature and technology both books are deeply involved in the ecological debates of that time. In “Where Late the Sweet Birds Sang”, Wilhelm illustrates an apocalyptic and post-historical scene: The story begins with a world-wide destroyed natural environment, which leads to an increasing development of infertility. In order to enable the continuation of mankind, a large US family decides to clone each member of the family clan in secret, sub-terrestrial laboratories. What has started as a kind of survival strategy develops its own dynamic and becomes an end in itself. After a few clone generations a clone society emerges that differs considerably from its ancestor community. The clones regard themselves as different from the original family members. New values arise around the topic of the sameness. Freedom, creativity and individuality are regarded as endangering the social organization. The main character of the novel is a young man (named Mark) who was not produced by clonal techniques but who was the result of a secret heterosexual relationship. At the end of the novel Mark, the outsider, manages to escape from the clone society. Together with a small group of fertile women he re-emigrates into the natural wilderness and builds up a new community. “Where Late the Sweet Birds Sang” picks up a number of biblical motifs (such as Noah’s ark and the Exodus), and is a tale about a given

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natural order that should not be destroyed by technological progress. The novel provides a clearly critical vision of cloning. The clone society is depicted in a stereotypical manner that is in line with Huxley’s “Brave New World”. The clone itself becomes a symbol for an uncreative demand for equality and the clone society, based on sameness and repetition, is a symbol not only for social stagnancy and cultural decline, but also for a standstill of historical changes.

Whereas Wilhelm’s story reads like an argument against a society that is based on gene technologies, visions about cloning in Naomi Mitchison’s “Solution Three” are more complex. The literary theorists Maria Ferreira has even argued that “Solution Three” is “among the few examples of clone narratives to portray cloning in future societies not only as acceptable but potentially positive.”50 Mitchison, the sister of the biologist J. B. S. Haldane, describes a homosexual structured society aiming to resolve the world's problems such as overpopulation and war by omitting sexual reproduction in favor of regulated reproduction by cloning.

“Solution Three” depicts also a post-historical and post-apocalyptic scenario: After a period of wars and ecological disasters which – as a consequence of overpopulation - had destroyed a lot of the world's areas, the world’s society is in the process of being rebuilt. This new phase, “Solution Three“, which is described as a radical new time period in which a memory of older historical experiences are only vaguely left, is guided by a so called “Code”, a sample of ethical rules that was introduced to build up a new social order free of any racial, sexual or class discrimination. The “Code” prohibits any aggressive behavior. People live in huge mega cities, in equally small houses, to leave enough natural space for food production. In this phase, the solution to solve the world’s population problem is to condition people to live as homosexuals without reproducing themselves. According to the “Code“, heterosexuality is regarded as deviant and unsocial behavior. An essential attempt to build up the new social order is reproduction by cloning, in particular the cloning of famous persons whose genetic makeup is expected to turn them into responsible members of the new society. In “Solution Three“, all the clones stem from “Him” and “Her“, from a white woman who had worked as a mission doctor in India and a black man who was a political fighter in former racial wars.

With “Solution Three” we find Mitchison’s critical response to the idea of cloning for eugenic reasons that was propagated by her brother, J.B. S. Haldane in 1962. Since the literary dialogue between “Solution Three” and Aldous Huxley’s “Brave New World” (1932) is obvious, the novel links the cloning debate of the 1970s to the 1920s/1930s debates on eugenic uses of reproduction technologies. But there are also important differences between Mitchison’s novel and the negative view of reproductive technologies, provided in “Brave New World”, where these techniques are used to serve eugenicist and dictatorial ends. “Solution Three” can even be considered to be a critical counter narration and feminist response to Huxley, since there are some echoes of Shulamith Firestone’s technical optimism and her argument for the emancipatory potential of artificial reproduction, a position that was much, and often critically debated within the feminist movement of the early 1970s. “Solution Three” is not a naive call that we use reproductive technologies such as cloning; on the contrary, the novel explores precisely the social and individual difficulties that can arise with these scientific processes. But in contrast to Wilhelm’s “Where Late the Sweet Birds Sang”, the novel is essentially an optimistic one. In the end it is due to two clone figures that a new period (“solution four”) arises in which the relation between sameness and variation in both areas, in science and society, in genetic constitutions and also in social behavior, is much more equitable. Emphasizing a dynamical view of the interrelations between science and society, Mitchison’s novel is a critical but nevertheless optimistic portrayal of science.

5. Clone is the “perfect metaphor of our conditions”

In 1983, we find a short article in the linguistic journal “American Speech” by Nicholas Howe that deals with the usages of the word “clone” in US culture. The article shows how much the term, which was almost unknown to a nonscientific audience in the 1960s, had

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52 Susan Squier has argued that we regard Solution Three as a kind of feminist approach to science. According to Squier, the “point (...) is not that, Naomi Mitchison persuades us to accept ectogenesis, cloning or surrogacy, but rather that she makes us aware of more options in our responses to those, as to any scientific technologies. She shows us that as feminists we may still be able to use, and profit from, scientific epistemologies and practices.” Susan Squier: Babies in Bottles. Twentieth-Century Visions of Reproductive Technology, New Brunswick: Rutgers Univ. Press, 1994, p. 198.
spread out in the decade after 1973. The author described several fields of every day culture, such as sports, TV, music, and newspapers where the word was found. Its usages were not “restricted to any one precise sense, but rather reveals a variety of connotations” ranging from xeroxing, over exact duplication to vague resemblance. “In a fascinating way”, the author summarized, the spread of clone into the American vocabulary illustrates our growing cynicism and pessimism regarding science and technology. If cloning and other techniques of bioengineering hold out promise for a better-fed and healthier world, they also reinforce the increasingly common perception among Americans that they live in a world given over to technocrats and engineers (...) In our post-industrial society, such metaphors as cog in a machine or robot seem slightly archaic and rather naïve. True, they are worn out by use, but they lack the technological sophistication as well as the suggestions of authoritarianism necessary for our world. In this respect, clone is the perfect metaphor for our condition. (HOWE, 1983, pp. 66-67)

The “clone” became a “perfect metaphor” for the 1970s situation precisely because longstanding meanings of the term (such as “standardization”, and “re-iteration”) fit very well into the discursive developments of that period, in which technologies had, in a new way, affected how society perceived “history” and the future. In the way, how the figure of the “human clone” (with its overtones of artificial creation of man) was discussed in the 1970s, two discursive movements of that period become apparent that were slightly different, but nevertheless interrelated. Both affected deeply the category of the “future”: one the one hand, a discourse in which the Enlightenment idea of “otherness of the future” was replaced by ideas of a designable future, by a future that can be planned and, to some extend, even build up already by the decisions and action of the present days. On the other hand, we find a discourse in which the very notion of “progress”, regarded as an alliance of scientific and technological innovations with social and political progressive movements, became deeply challenged and replaced by apocalyptic visions of the end of history of mankind.

Cybernetic inspired attempts to do “research on the future”, became dominant already in the late 1960s. This new futuristic movements provided specific attempts to

deal with issues of acceleration, and the “otherness” - that is: the dimension of the uncertainties - of the future. Working with cybernetic and system theoretical models of calculation, the hope was to receive recommendations for political action in the present. As a consequence, the difference between the “future” and the “present” faded more and more away in the social perception of time. The way how the “human clone” (which itself had semantic overtones of an “everlasting presence”) was discussed in the 1970s, namely as something that was not a dystopian or utopian vision of the future anymore but had become a reality already in the present, very clearly expresses this replacement of the “otherness of the future” by ideas of an extension of the present. However, the replacement of the “otherness of the future” did not necessarily mean that dystopian visions get ground. On the contrary, whereas visions of the late 1960s were mostly optimistic about “scientific progress”, a massive turn towards pessimistic prospects, accompanied by a feeling of crisis in several fields, took place not earlier than the early 1970s. With the public controversies about biotechnologies and environmental issues in the 1970s, optimistic views of scientific progress were replaced by apocalyptic visions of the end of historical times caused by technologies. In science fiction novels the figure of the “human clone” and the motif of clone societies became symbols for the destroying power of a technology that turned life and nature into a resource and that lead, in the end, to a collapse of civilization and history. However, as Mitchison’s “Solution Three” shows, the literary treatment of cloning also developed along other lines than in a stereotypical manner. With that, some 1970s science fiction was ahead of the main discourse of its time.

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*Christina BRANDT, Prof. Dr.*
Ruhr-Universität Bochum
christina.brandt@rub.de

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