The Will to Modernize: A Genealogy of Biomedical Research Ethics in Singapore[1]

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This article is a contribution to the sociological and anthropological literature on the recent globalization of Western biomedical research ethics and bioethics. Focusing on Singapore, the article identifies and traces the genealogy of the concepts, expertise, and techniques that made it possible to introduce and develop a bioethical assemblage in the Southeast Asian city-state at the turn of the twenty-first century. It argues that what made such a development possible was a particular style of reasoning, the ''will to modernize,'' which has characterized the thinking and acting of the Singaporean leadership ever since the country's independence. After describing the elements that make up the will to modernize, most notably the concept of modernization-as-economic-development and the notion of infrastructure, the article shows how these elements have allowed for Singapore's efforts to transform the island into a global hub for the life sciences from the mid-1980s onward. The article also shows how the development of a bioethical assemblage in the Republic was made possible by the fact that, for the governing elite, such an assemblage was conceived as a ''(soft) infra-structure'' that was necessary to transform Singapore into a global hub for biomedical research.

The assemblage of knowledge, experts, and techniques that makes up Western biomedical research ethics has become increasingly influential and widespread of late, transforming the way in which the medical use of human beings is thought of and governed around the globe (Salter and Salter 2007; Sunder Rajan 2007; Fox and Swazey 2008; Petryna 2009; Reubi 2009). This bioethical assemblage and the logic of rule it embodies was, together with the wider field of bioethics, articulated from the 1960s onward by a network of doctors, lawyers, and philosophers in North America and Europe that was alarmed by the dangers that medical research posed to human beings (Rothman 1990; Jonsen 1998; Cooter 2000). By the late 1980s, the knowledge and techniques developed by this new type of experts had been widely adopted by patient advocacy groups, funding agencies, medical associations, hospitals, governments, and pharmaceutical companies across the West (Jasanoff 2005: chapter 7; Reubi 2009). It is this bioethical assemblage and its associated mentality of rule which, over the last 15 years, have been progressively exported to non-Western parts of the world where, until then, bioethics was unheard of. This globalization of Western

medical research ethics, which is now occurring in an ever-increasing number of countries especially in Asia, comes in a variety of complementary forms. These include: the setting up of bioethics commissions by national governments; the drafting of international ethical norms by organizations like the International Conference on Harmonization and UNESCO; the establishment of professional bodies like the Asian Bioethics Association; the adoption of ethical guidelines in laboratories and hospitals; capacity-building programs in bioethics run by the WHO; the development of courses in bioethics at universities; and the use of strict ethical procedures by multinational pharmaceutical companies and contract research organizations when conducting research in developing countries.

This article examines this recent dissemination of the Western bioethical apparatus and the logic of rule it embodies in relation to the medical use of human beings. More specifically, it identifies and traces the articulation of the intellectual concepts, institutional forms, types of expertise, and techniques of government that made it possible to introduce Western research ethics in the Southeast Asian Republic of Singapore at the turn of the twenty-first century. As with other Asian countries, the knowledge and practices that make up medical research ethics and, more generally, bioethics were unknown in Singapore until the Government decided, in the late 1990s, to import a bioethical assemblage modeled on the ones in place in the United Kingdom and, to a lesser extent, the United States. Taking a genealogical approach (Rabinow 1989; Foucault 2004; Miller and Rose 2008), this article argues that the import of Western biomedical research ethics in Singapore has been made possible by what I term the ''will to modernize'': a ''style of reasoning'' (Hacking 1992) that has characterized the way the Singaporean leadership thinks and acts ever since the country's political independence in 1959.[2] Interestingly, these conditions of possibility are in stark contrast to the critical attitude toward modern medicine and modernity more generally that, together with networks of doctors, lawyers, and philosophers, allowed for the articulation of biomedical research ethics in the West from the 1960s onward (Stevens 2000; Reubi 2009: chapter 4).

To demonstrate the argument outlined above, the article first describes the key theories, institutional forms, and techniques that make up this will to modernize, concentrating in particular on the notion that modernization is achieved through economic development and the concept of ''infrastructure.'' The article then shows how these elements that compose the will to modernize have allowed for Singapore's efforts to transform the island into a ''world-class hub for the life sciences'' from the mid-1980s onward. Finally, the article shows how the development of a bioethical assemblage in Singapore was made possible by the fact that, for the Singaporean elite, such an assemblage was conceived as a ''soft infrastructure'' which was necessary to modernize and transform the Republic into a world-class hub for the life sciences. Before presenting this three-tiered argument, the article outlines the development of biomedical research ethics in Singapore at the turn of the twenty-first century.

The article makes an original contribution to the sociological and anthropological literature on the globalization of Western research ethics and, more generally, bioethics. Most of this literature has sought to demonstrate the ''failures''

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[2] By the terms, ''Singaporean leadership'' and ''Singapore's governing elite,'' I refer to a remarkably stable network of politicians, civil servants, managers, entrepreneurs, academics, and journalists that took control of Singapore after independence in 1959. Organized around the People's Action Party, the government and its administration, various specialized agencies, national companies and investment funds, a carefully controlled media, and a multitude of parapolitical organizations, this network has micro-managed Singapore up to this day in an authoritarian yet efficient and successful manner (Perry, Kong, and Yeoh 1997; George 2000; Rodan 2006). This network's power in governing Singapore and the lack of influence of other bodies (professional associations; civil society organizations; etc.) warrants this article's exclusive focus on this leadership when examining the conditions of possibility of bioethics in Singapore.

and ''shortcomings'' of the bioethical apparatus that has recently been disseminated around the world. Analyzing this dissemination process in relation to the concomitant creation of a global biomedical economy, some authors (Sunder Rajan 2007; Petryna 2009) have argued that the introduction of bioethics in countries like India and Mexico does not protect the populations living there. Instead, they argue, the introduction of bioethics gives an appearance of morality that allows transnational pharmaceutical companies, in alliance with these countries' governments, ''to exploit'' these populations as research material for monetary gains. Other authors (Holden and Demeritt 2008) have examined the globalization of research ethics in relation to the notion of ''democracy.'' For them, the adoption by countries like Singapore of bioethical assemblages characterized by ''bureaucratic procedures'' and ''paperwork'' has only served to buttress the authoritarian regimes already in place. A third and last group of authors (Geissler 2005; Molyneux et al. 2005) have argued that Western bioethics is ''ethnocentric'' and thus unable to understand and protect populations in places like rural Kenya which have very ''different cultures'' to that of the West. In contrast to all these authors, the present article does not analyze the globalization of bioethics with a view to highlight the ''failures'' or ''shortcomings'' of the bioethical assemblage outside the West. Instead, this article asks what are the conceptual, material, and political conditions that made it possible to develop biomedical research ethics in the non-Western world. More specifically, it identifies and traces the genealogy of the intellectual concepts, institutional forms, types of expertise, and mechanisms that made it possible to introduce a Western bioethical assemblage in the Southeast Asian Republic of Singapore from the late 1990s onward.

The Introduction of Biomedical Research Ethics in Singapore

As already alluded to, biomedical research ethics is best understood as an ''assemblage of knowledge, expertise, and techniques'' (Rabinow and Rose 2003; Collier and Ong 2005) that embodies a particular logic to problematize and govern the use of human beings in medical research. This bioethical assemblage and associated logic of rule, which was articulated in both the United States and United Kingdom from the 1960s onward together with the wider field of bioethics, is characterized by three elements in particular (Reubi 2009; cf. also: Jasanoff 2005: chapter 7; Armstrong 2007; Salter and Salter 2007). The first element is the belief that the use of human beings in medical research is fraught with potential dangers for these human beings. These dangers, it is further believed, are ''ethical problems'' that need to be solved through a reorganization of the way biomedical research is conducted so that humans are protected and respected. The second element is ''the bioethical committee,'' an organizational form characterized by both its mandate and membership. Its mandate is to identify, analyze, and recommend solutions to the ethical issues that arise from the medical use of human beings. Its membership is composed of ''experts in bioethics''—medical scientists, philosophers, lawyers, and social scientists specializing in the ethical, social, and legal aspects of the biomedical sciences. The third element is the ''ethical framework''—a combination of ethical guidelines and technologies generally put forward as the solution to the ethical problems generated by the use of human beings in medical research. The ethical guidelines include: rules relative to the research's risks and scientific value; rules relative to the researchers' medical qualifications; rules relative to the obligation for researchers to obtain the subjects' informed consent prior to any experiment involving them or parts of their bodies; and rules relative to the storage and disposal of human body parts used in research. The ethical technologies include different devices, procedures, and monitoring mechanisms that seek to

operationalize the rules mentioned above such as instruction manuals, patient information sheets, consent forms, and research ethics committees.

Before the late 1990s, the beliefs, language, institutional forms, expertise, rules, procedures, and other techniques of government that characterize the modern bioethical assemblage were conspicuous by their absence in Singapore (Gwee 1981; Holden and Demeritt 2008). Of course, the Southeast Asian Republic had long had what scholars term ''traditional'' medical ethics. But, articulated around codes of conduct relating to physicians' professional activity and professional medical associations, ''traditional'' medical ethics is informed by a very different logic than bioethics or ''modern'' medical ethics—the defense and consolidation of the power of the medical profession (Armstrong 2007; Reubi 2009: chapter 4). Bioethics and, more particularly, biomedical research ethics were only introduced in Singapore from the late 1990s onward. Two episodes were especially important for the introduction and development of research ethics in Singapore. The first was the work of the National Medical Ethics Committee (NMEC) between 1996 and 1998. Although initially created to reassert the importance of ''traditional'' medical ethics and regulate euthanasia in 1994 (Yeo 1994), the NMEC later published guidelines ''to ensure that the rights and welfare of [human] research subjects are protected' against the dangers of medical research'' (Ministry of Health 1998:8). These guidelines, in particular the *Ethical Guidelines on Research Involving Human Subjects*, constituted Singapore's first regulatory system to protect human research subjects. Modeled on ethical frameworks existing in the West, this system introduced new expressions, practices, and institutions borrowed from Western bioethics such as ''human being,'' the ''principle of autonomy,'' ''research ethics committees,'' and ''informed consent procedures'' (Ministry of Health 1998:Annex IV/D; Ministry of Health 1999).

The second important episode in the introduction and development of Western research ethics in Singapore was the creation of the Bioethics Advisory Committee (BAC) in 2000. Staffed with philosophers, lawyers, and doctors mandated ''to examine the potential ethical, legal, and social issues arising from research in the biomedical sciences'' in Singapore, the BAC is the city-state's first institution solely dedicated to biomedical research ethics (BAC 2002b:1). It has, since its creation in 2000, published five reports on topics like the medical use of human stem cells and personal information in genetic research. These reports contain a series of guidelines and techniques that seek to ''protect human life and the rights and welfare of the individual'' against the dangers posed by medical research (BAC 2002a:i). Borrowed from Western bioethical assemblages, the guidelines and techniques contained in these reports have consolidated the ethics framework set up by the NMEC, systematizing it and expanding it to new areas of medical research.

The NMEC and the BAC did not only introduce the belief that human beings should be protected against the dangers of medical science, Western-modeled ethical frameworks, and the bioethical committee in Singapore. They also contributed to create a pool of local experts in bioethics by offering the opportunity for philosophers, lawyers, and doctors to research and decide on ethical issues related to medical research. Furthermore, they gave research ethics and bioethics more generally a wider recognition in Singapore through a series of initiatives like the introduction of courses in medical ethics at the National University of Singapore (NUS) and the organization of public consultations on ethical issues. These initiatives have been followed by a flurry of bioethical projects developed by others actors in Singapore, including: the opening of the NUS Centre for Biomedical Ethics; the publication of articles on bioethics written by Singaporean academics (for example, Oriola 2002; Tay and Tien 2005); the adoption of ethical guidelines and research ethics committees by hospitals and universities;

and an ever increasing number of articles on bioethics in *The Straits Times,*
Singapore's main daily newspaper and the government's official outlet.[3]

The "Will to Modernize"

This article argues that the development of a Western bioethical assemblage in
Singapore has been the result of a particular style of reasoning that has charac-
terized the thinking and acting of the Singaporean leadership from the country's
independence to this day and that I term ''the will to modernize.'' The present
section gives an outline of this will to modernize when it was first put together
by Lee Kuan Yew and his People's Action Party (PAP) in the 15 years that
followed Singapore's separation from the British Empire in 1959. This was a
difficult period by any account with widespread poverty, a stagnating economy,
high unemployment rates, serious political unrest, racial riots, and tensions
between the region's countries. It was faced with these difficult conditions that
Prime Minister Lee and his allies, who had came to power with PAP's win in the
1959 national elections, articulated the different elements of the will to modern-
ize in reports, plans, and conferences. The present section also shows how the
will to modernize has continued to inform the thinking and acting of the Sin-
gaporean leadership up to this day even though some of its features had to be
adapted to the changing economic and geopolitical realities of the last 35 years.

The will to modernize is articulated around five elements in particular. The
first one is a conception of modernization as economic development and
growth. For the Singaporean leadership of the 1960s and early 1970s, modernity
was associated with material well-being achieved through economic development
and growth (Margolin 1989: chapters 1, 3, and 5; Chua 1995: chapter 3; Perry
et al. 1997: chapter 5). As Singapore's first Minister of Finance Keng Swee Goh
(1977:191) argued, ''the modernization process'' is about ''creating increased
material well-being for our citizens''; it is about creating ''more jobs, bigger
incomes, better career prospects, better homes: in short a better life, materially.''
This material well-being was to be achieved, for the most part, through economic
development and growth. As Goh further explained:

> Economic development… is how to make man better off materially, how he can
> have more and better food to eat, better homes to live in, better education for
> his children, better means of transportation, more leisure, in fact, how man can
> achieve a fuller life. (Goh 2004 [1972]:45)

Until the mid-1970s, economic development and growth was, according to the
Singaporean leaders and the international experts who counseled them, synony-
mous with industrialization (Margolin 1989: chapter 1; Perry et al. 1997: chapter
3). Industrialization, for the Singaporean elite, was understood as the creation of
manufacturing industries using a cheap labor force with very low skills. Further-
more, Singapore also adopted an export-oriented model of industrialization.
According to this model, the aim for the country's leaders was not to create
national industries producing for the local market but to attract large foreign
multinational companies to relocate their factories on the island and manufac-
ture products for export worldwide. As Lee Kwan Yew explained:

> We had to link up with the developed world—America, Europe, and Japan—and
> attract their manufacturers to produce in Singapore and export their products
> to the developed countries. (Lee 2006:75–76)

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[3]A simple keyword search using the electronic database *Factiva* shows that *The Straits Times* published fewer than
5 articles containing the words ''medical ethics'' or ''bioethics'' before 1994, while it published more than 160 in
the period between 2000 and 2007.

The second element which is characteristic of the will to modernize is a belief that it is for the government to plan and direct economic development and growth. For the Singapore leadership, government had a key role to play in the modernization and industrialization process: that of ''the planner and mobilizer of the economic effort'' (Goh 1977:191; cf. also: Margolin 1989: chapter 4; Huff 1995; Perry et al. 1997: chapters 3 and 5). This did not mean government organizing and running the entire production system on its own, but meant government firmly guiding and supporting the economy. Given Singapore's export-oriented industrialization model, firmly guiding and supporting the economy was conceived as determining areas of economic growth and attracting the relevant multinational companies to settle in Singapore by offering them the best possible conditions to do business.

In order to fulfill its role as planner and mobilizer of the economic effort, the Singaporean government deployed two techniques in particular. The first technique was the creation of a special agency to spearhead Singapore's economic development and industrialization: the Economic Development Board (EDB). Created in 1961, the EDB had two principal tasks: (i) monitoring the world market so as to identify the industries which are desirable to Singapore's long-term development; and (ii) finding interested foreign multinational companies active in the relevant industries and luring them to Singapore (Margolin 1989:67–71; Perry et al. 1997: chapter 5). The second technique was the economic development plan which was introduced to ensure that the government's efforts to industrialize were systematic, smooth, and efficient (Margolin 1989:64–66; Huff 1995). Singapore's first such plan was the Ministry of Finance's *Development Plan 1961–1964*. This plan, as the ones that followed, outlined a series of strategies to lure foreign multinational companies to relocate part of their production in Singapore so as to industrialize and develop the Republic. These strategies included, in particular: (i) the supply of financial and technical assistance for these companies; (ii) strategies to develop the population and transform it into a qualified and disciplined citizenry employable by multinational companies; and (iii) the building of an outstanding industrial infrastructure for companies (Ministry of Finance 1961).

The third element around which the will to modernize is articulated is strategies to develop the population of Singapore and transform it into a qualified and disciplined citizenry that could be employed by multinational companies that relocate their production on the island (Margolin 1989: chapter 4; Chua 1995: chapter 3). For the Republic's elite, the population of Singapore was conceived as a ''human capital'' that played a key role in the country's modernization and industrialization. Indeed, a qualified and disciplined citizenry was an asset with which to attract foreign multinational companies looking for a cheap and reliable workforce. In that respect, the population was a resource that had to be protected, developed, and improved through a series of measures outlined in economic development plans. The measures found in the *Development Plan 1961–1964*, for example, included: the creation of health-care facilities to have a healthy and productive population; the expansion of the educational system to instill the population with the relevant skills and appropriate attitude for work; the construction of social housing and social amenities to manage and organize the population; the creation of an official trade union to manage the workforce; the development of parapolitical structures and nation-building programs to inculcate a spirit of common loyalty and control the citizenry (Ministry of Finance 1961: chapters 9–10; cf. also: Margolin 1989: chapter 4; Chua 1995: chapters 3 and 5; Perry et al. 1997: chapter 3).

The fourth element around which the will to modernize is articulated is measures to build an outstanding infrastructure for industrialization (Chua 1995: chapter 3; Perry et al. 1997: chapter 5). For the Singaporean leadership in the

1960–1970s, infrastructure was understood as primarily physical and included, among others: (i) an infrastructure to ensure the generation and distribution of electricity, gas, and water; (ii) a transport and telecommunication system; and (iii) fully equipped industrial estates like the Jurong Industrial Estate, Southeast Asia's largest industrial area at the time (Ministry of Finance 1961: chapters 7–8). In accordance with Singapore's export-oriented model of economic development, the aim of this infrastructure was to attract foreign companies to relocate their production on the island. As Goh Keng Swee explained:

> As regards infrastructure, we tried to make it easy and attractive for manufacturers to set up business in Singapore [by building] large industrial estates,… [a] port to handle bulk cargo,… rail and road transportation, [and] adequate supplies of power. (Goh 1977:8)

The fifth and last element around which the will to modernize is articulated is the rhetoric of survival (Chua 1995:105; Perry et al. 1997:7). For the Singaporean leadership, the will to modernize and develop economically was not a natural given but had to be encouraged and cultivated. As Keng Swee Goh (2004 [1972]:53) argued, people must be ''aroused from their lethargy'' and ''must [be made to] desire progress.'' The rhetoric of survival was, according to the Singaporean elite, the mechanism to do so. Its underlying logic is straightforward: when placed in a life threatening situation, you either improve or you perish. Following this logic, Singapore's leadership ''cultivated a continual sense of crisis and urgency'' so as to instill in the population a desire to mobilize and work hard for the country's economic development and industrialization (Perry et al. 1997:6). In the 1960s and 1970s, this sense of crisis and urgency was generally generated through narratives describing Singapore's difficult situation—poverty, political unrest, and regional tensions (Perry et al. 1997:6–7).

The Persistence of the Will to Modernize After the 1960s

The will to modernize and its five key elements have continued to inform the thinking and acting of the Singaporean leadership after the 1970s and up to this day, not the least because of the continuity that has characterized Singapore's elite since 1959 (George 2000; Rodan 2006). Modernization and economic development have continued to be one of the key rationales for the Singaporean leadership (George 2000:27–38). For example, Lee Kuan Yew's son and current Prime Minister Hsien Loong Lee (2004) recently argued that Singapore's goal is to ''build a vibrant and competitive economy'' in order ''to create good jobs and improve the lives of all citizens.'' Furthermore, the Singaporean elite still sees the government as the planner of the economic effort through both the EDB and economic development plans like the 2003 *New Challenges, Fresh Goals* (Rodan 2006). Similarly, strategies to develop the population and the building of a world-class infrastructure have remained key elements of Singapore's economic development plans and have continued to be understood by the governing elite as central to the country's modernization. For example, the latest plan explained that, in order ''to create a better future,'' Singapore must ''develop people to the full'' and ''buil[d] a first-class up-to-date infrastructure'' (Economic Review Committee 2003:4–5, 14). Finally, the Singaporean elite has also continued to use the survival rhetoric. For illustration, Singapore's latest plan argues that, given ''the Asian Financial Crisis'' and the regional ''political and security uncertainties,'' the population ''will need to work doubly hard'' in order to ''sustain healthy economic growth'' (Economic Review Committee 2003:4, 29).

While the will to modernize's overall logic and key elements have remained the same until today, some of its features have of course been adapted to the

changing economic and geopolitical realities of the last 35 years. Two of these adaptations need to be highlighted. The first one is a reconfiguration of the ways of understanding how economic development and growth should be pursued, with a shift from low-skills industries to international services and high-tech industries (Margolin 1989: chapter 5; Perry et al. 1997: chapter 5; Rodan 2006). This economic and industrial diversification, which started in the late 1970s and accelerated in the 1980s, was triggered by the realization that, in relation to low-skills industries and compared with other countries, Singapore was losing its attractiveness for MNCs and needed to shift its attention to economic activities with higher growth potential. The second adaptation was a modification of the narratives used to generate the ''sense of crisis and urgency'' at the heart of the survival rhetoric. From an under-developed country riddled by political and racial tensions in the 1960s, Singapore had become an affluent, multicultural nation with a strong government in the late 1990s (Perry et al. 1997). This development made the crisis-generating narratives of the 1960–1970s obsolete and in need of replacement. Thus, in lieu of poverty and strife, Singapore's elite started, from the 1980s onward, to emphasize the dangers of settling complacently for the present levels of prosperity in a world where economic competition had become fiercer than ever. Faced with these new dangers, the governing elite argued that Singapore needed to work even harder than before and continually upgrade its economy (Perry et al. 1997:6–7).

Biomedical Research as Engine of Economic Growth

Before the mid-1980s, there was almost no meaningful biomedical research carried out in Singapore, with the island lacking the necessary talent pool, infrastructure, and means to do so (Feng 1986). This was to change with the publication by the country's Economic Committee of a 1986 report entitled *The Singapore Economy: New Directions*. The report, which played a central role in the country's efforts to diversify its economic activities in the 1970–1980s, identified ''biotechnology'' as one of the main drivers of Singapore's future economic development and called for the government to promote ''research and development'' in this field (Economic Committee 1986:147–148). This was to be the start of 20 years of sustained efforts on behalf of the Singaporean government to promote biomedical research with the view, as the Ministry of Trade and Industry (2006: I, 11) recently explained, of transforming the island into a ''global biomedical sciences hub'' with ''world-class capabilities'' (cf. also: Holden and Demeritt 2008; Waldby 2009). These efforts have included: creating agencies to promote and advise on biomedical research (for example, National Science and Technology Board); establishing funding agencies (for example, Biomedical Research Council); expanding the national budget allocated to medical research from $SG 2 billion in 1991 to $SG 13 billion in 2006; developing the life sciences at Singapore's universities; creating specialized biomedical research centers; training Singaporeans as biomedical researchers and technicians; and luring foreign medical researchers and multinational companies active in the life sciences to Singapore. The present section shows how these efforts to turn Singapore into a world-class hub for the life sciences were made possible by each of the five key elements that make up the will to modernize described in the previous section.

The manner in which the will to modernize has made the promotion of biomedical research possible is evident, firstly, in the way the notion of modernization-as-economic-development informs the Singaporean authorities' conception of the life sciences. For them, biomedical research is, primarily, an area that the country has to develop so as to ensure its economic development. Indeed, for them, a solid competence in biomedical research is the foundation for a

biomedical industry that makes products with high added-value and thus offers great potential for growth. As the Singaporean leadership has regularly argued over the last 20 years, the ''biomedical sciences'' and its related ''manufacturing cluster'' are one of the country's most ''important growth engines'' and ''high value-added activities'' which will generate ''continued economic growth'' and ''prosperity'' (National Science and Technology Board 1996:13; Economic Review Committee 2003:12; Ministry of Trade and Industry 2006:iii). This particular understanding of biomedical research has its roots in Singapore's efforts to diversify its economic activities and focus on international services and high-tech industries from the late 1970s onward. It was as part of these efforts and at a time when molecular biology's commercial potential had become evident with the emergence of a highly profitable biotech industry in the United States that the promotion of biomedical research was identified as a strategy for Singapore's future economic growth. As the Economic Committee (1986:145–148) explained: ''biotechnology'' is a ''high-tech industry'' that constitutes a promising ''area for growth'' due to its ''high value-added content.''

The way the will to modernize has made the promotion of biomedical research possible is also evident in how these efforts have been informed by the belief that it is for government to plan economic development and growth. As Rodan (2006) has shown, the promotion of biomedical sciences in Singapore has been chiefly orchestrated by the government itself. In conformity with the export-oriented model of economic development, the government has sought to develop the country's biomedical research and industry by attracting multinational companies active in the life sciences to move to Singapore by offering them the best conditions in which to conduct R&D and manufacture products. To do so, the government has used two techniques which are very similar to those it used to industrialize the country in the 1960–1970s. The first one is the creation of specialized ''government agencies responsible for promoting [biomedical] research and development'' in Singapore, a technique strikingly similar to the establishment of the EDB to spearhead the country's industrialization in 1961 (National Science and Technology Board 1991:21). The most important of these agencies is the National Science and Technology Board (NSTB), recently renamed the Agency for Science, Technology, and Research (A*Star). Founded in 1991, the NSTB/A*Star's mandate is to spearhead the transformation of Singapore into a ''knowledge-based economy'' with ''world-class scientific research and talent'' in order to ''boost the country's economic competitiveness'' (Agency for Science Technology and Research 2009). The second technique used by the government to promote the life sciences is the ''science and technology plan,'' a technique alike the ''economic development plans'' employed to industrialize the country in the 1960–1970s. There are many examples of such plans, including: the 1991 *Window of Opportunities: National Technology Plan*; the 1996 *National and Technology Plan—Securing Our Future*; and the 2005 *Science and Technology 2006-2010 Plan*. Like the economic development plans of the 1960–1970s, these successive science and technology plans outlined strategies to lure foreign multinational companies active in the life sciences to relocate part of their research and production in Singapore. These strategies included, in particular: (i) the supply of financial and technical assistance; (ii) the development and transformation of the population into a disciplined and qualified citizenry; and (iii) the building of an outstanding technological infrastructure.

The importance of the will to modernize in allowing for Singapore's efforts to promote biomedical research is also visible in the government's use of strategies to transform the population into disciplined and qualified citizenry employable by multinational biotechnology and pharmaceutical companies. Like the measures to develop the population for industrialization in the 1960–1970s, the strategies deployed to promote biomedical research partake in the belief that

"enhancing Singapore's most important resource"—"its people"—is "the most single important factor toward achieving developed status" (Economic Planning Committee 1991:7). But, while the measures to develop the population for industrialization were multiple, the strategies to enhance the quality of the people in order to transform Singapore into a knowledge-based economy focus primarily on education. This is a focus which informed all of Singapore's economic diversification strategies from the late 1970s onward, when the government identified "the education level of the population" as a "fundamental requirement of economic growth" and "the driving force of development" and modernization (Economic Committee 1986:13, 59). Singapore's science and technology plans contain three types of strategies to enhance the education level of the population. First, they comprise measures to provide people with biomedical "knowledge" and "skills" so as to provide companies with the necessary "manpower" to undertake "R&D activities" (Economic Planning Committee 1991:72). These include: "expanding Masters and PhD programs;" providing "scholarships and grants;" and offering "career counseling and guidance" (Economic Committee 1986:149; National Science and Technology Board 1991:40–41). Second, they comprise measures to recruit foreign scientists to increase the numbers of researchers in Singapore and to offer the local population access to "knowledge and skills" (National Science and Technology Board 1991:38). Third, they comprise measures to create a "research and development culture," that is schemes to raise the population's interest in science and its "awareness" of the role of research "for Singapore's prosperity" (National Science and Technology Board 1991:39). Similar to the nation-building activities of the 1960–1970s, these measures include "publicity campaigns to promote R&D careers" and "workshops to promote an interest in science and technology" (National Science and Technology Board 1996:35).

The way the will to modernize has made Singapore's promotion of the life sciences possible is also apparent in the building, by the government, of a world-class "technological infrastructure" (National Science and Technology Board 1991; National Science and Technology Board 1996). Like the industrial infrastructure of the 1960–1970s with which the government lured companies to transfer their production to the island, the technological infrastructure's aim is to provide a "dynamic and vibrant environment" that "will make it easy for foreign companies to re-locate R&D operations in Singapore" (Ministry of Trade and Industry 2006:52). Singapore's technological infrastructure comprises two elements: the "physical" and the "soft infrastructure" (Economic Planning Committee 1991:50; National Science and Technology Board 1991:71; Ministry of Trade and Industry 2006:52–55). The physical infrastructure is the "Technology Corridor," a project conceptualized in 1990 and continually developed ever since that is reminiscent of the Jurong Industrial Estate in both its size and importance (National Science and Technology Board 1991:71). Like other technopoles in Europe or North America, it seeks to provide a working and living space for "researchers, industrialists, financiers, and managers" (National Science and Technology Board 1991:71–72). It comprises most of Singapore's higher education establishments; research and business facilities; and residential areas complete with retail facilities, schools, hospitals, and cultural amenities (National Science and Technology Board 1991; Ministry of Trade and Industry 2006; cf. also: Wong and Bunnell 2006). Particularly important for biomedicine is the purpose-built research hub named Biopolis that includes laboratories, offices, a DNA repository, and an academic library (Ministry of Trade and Industry 2006). The soft infrastructure, a term coined by Harvard Business Professor Michael E. Porter and introduced in Singapore in the early 1990s, corresponds to "elements of a country's economy and society" that are not part of the physical infrastructure but represent "key competitive advantages" for this country

and ''make it dynamic'' in the global economy (Economic Planning Committee 1991:50, 54). The soft part of Singapore's technological infrastructure is made up of two elements in particular: (i) an up-to-date intellectual property legal system compatible with international norms (National Science and Technology Board 1991:67); and (ii) schemes to encourage ''technology entrepreneurship'' such as business counseling and guidance to administer patents (National Science and Technology Board 1996:42).

Finally, the importance of the will to modernize in allowing for Singapore's efforts to promote the life sciences is also evident in the way these efforts are associated to the survival rhetoric by the country's governing elite. From the 1980s onward, the latter continuously argued that Singapore could not be complacent and settle for the present levels of prosperity in a world where economic competition was fiercer than ever; instead, Singapore needed to work even harder than before and continually upgrade its economy (Perry et al. 1997:6–7). One possible way for upgrading the economy, the Singaporean leadership suggested, was to invest in knowledge-based industries and, especially, the biomedical industry. As an influential government member asserted, Singaporeans could not afford to ''ignore the implications of new technologies'' like ''genetic engineering and biotechnology'' (Dhanabalan 1983:6). On the contrary, they needed to ''acquire new skills, identify new opportunities and absorb new ideas;'' they ''needed to retrain, upgrade, educate'' and ''move up or remain, as they once were, hewers of wood and drawers of water'' (ibid. p. 6–7). Similarly, Singapore's most recent science and technology plan argued that ''Singapore must continue its process of upgrading and renewal to ensure that [it] remains competitive in the global knowledge economy'' (Ministry of Trade and Industry 2006:4).

Biomedical Research Ethics as Soft Infrastructure

This section shows how the development of a bioethical assemblage in Singapore from the late 1990s onward was made possible by the will to modernize that has informed the Republic's leadership since 1959. To do so, it starts by showing how, for the governing elite, biomedical research ethics was a part of the infrastructure that was necessary to transform the country into a world-class hub for the life sciences and ensure its economic growth. Then, the section explains that, at the heart of such an understanding, was the assumption that a bioethical assemblage modeled on internationally recognized standards would guarantee the credibility or good reputation of Singapore's biomedical research base around the world.

For the Singaporean leadership, biomedical research ethics was, like laboratories and an IP system, a key element of the infrastructure that the country needed to have in order to be a world-class hub in biomedical sciences. As Trade and Industry Minister George Yeo explained, when announcing the creation of the BAC in December 2000:

> Singapore is committed to the long-term development of the Life Sciences as an important pillar of Singapore's economy in the coming decades... [and] we are putting in place the major building blocks needed for the development of the Life Sciences industry:... [1.] build[ing] up a technology and research infrastructure;... [2. ensuring] the availability of venture capital;... [3.] put[ting] in place an ethical framework to guide research... [4.] re-orientat[ing] the entire education system [so as to] nurture local talent;... [and 5.] attract[ing] large numbers of foreign talents. (Yeo 2000:2–3)

Similarly, Singapore's latest science and technology plan describes the BAC and the ethical regulations for research it has put in place as a ''soft infrastructure''

that will, together with other elements of Singapore's ''research infrastructure,'' transform the island into a world-class hub for the life sciences:

> World-Class Research Infrastructure. Singapore has made significant progress in creating an attractive environment with high quality facilities to support research and technology activities… that will make it easy for foreign companies to locate R&D operations in Singapore. With good infrastructure support, Singapore hopes to… position itself as the R&D gateway to Asia, through which companies can access the attractive markets in the region. [Singapore's research infrastructure comprises:] A. The physical infrastructure: [1.] Biopolis, the centre of biomedical research in Singapore… with its scientific equipment…; [2.] the Singapore Tissue Network, the national tissue and DNA repository… B. The soft infrastructure: [1.] the Bioethics Advisory Committee…; [2.] the National Advisory Committee for Laboratory Animal Research. (Ministry of Trade and Industry 2006:52–55)

The reason why Singapore's leaders thought that a bioethical assemblage was a necessary piece of the country's ''world-class research infrastructure'' is because they identified research ethics as a mechanism to ensure the ''credibility'' or ''good reputation'' of Singapore's research base (Woo 1999:7; BAC 2004:3). Since it started promoting biomedical research in the mid-1980s, Singapore's aim was to be one of the best centers for the life sciences worldwide. This, of course, meant avoiding being labeled a ''new wild east'' (Elliott 2007) or a ''renegade jurisdiction'' (Lim cited in Ong 2001) where scientists and companies of little repute and reliability would come and undertake unethical research of substandard quality. Adopting and implementing biomedical research ethics was deemed to be the best remedy against such a label. Professor Lim Pin, Chairman of the BAC and former deputy chairman of the EDB, was explicit about that:

> It became clear [in the late 1990s] that in order to be successful, we needed to have a good reputation. We needed credibility and therefore had to have an ethical framework for research.… One fear for young developing countries wanting to succeed [like Singapore] is that in order to succeed they will do anything, including research deemed unethical elsewhere, and thus become identified as a [second-class] country.… We want to avoid that. We want to be internationally competitive. We want to be equal and ethics is a critical part in achieving this. It is essential. (Lim 2007)

In other words, ethics governance was understood as a mechanism which would guarantee the good reputation of Singapore's research base and thereby participate in establishing the island as a world-class hub for the life sciences. For example, the BAC, Singapore's main institution in the field of biomedical research ethics, explained its role like this:

> We hope that in establishing clear and transparent rules, standards, and procedures, the reputation of Singapore as a global centre of excellence in biomedical research will be upheld and strengthened. (BAC 2004:3)

Similarly, a member of the Singaporean cabinet (Sadasivan 2003:3) explained that the ethical ''framework for licensing, controlling, and monitoring of biomedical research activities'' put in place by the BAC ''would strengthen [Singapore's] international reputation and standing as a research centre.''

The aim was not to render Singapore's biomedical research credible to its own population. Indeed, unlike in the United States or the United Kingdom, there had been no scandals or public outcries related to abuses committed by medical researchers. There was actually so little interest in the topic among the

population that many of the BAC's scheduled dialogue sessions with the public had to be canceled. Rather, the aim of research ethics was, for the Singaporean leadership, to ensure that the country's biomedical hub had a good reputation in the eyes of an international audience that comprised foreign life scientists and multinational biotechnological and pharmaceutical companies (Woo 1999; Elliott 2007). Given Singapore's export-oriented economic model, what this international audience thought of the country was, of course, very important. Those in government feared, in particular, that if Singapore was viewed as a place where ethically dubious research was carried out, no foreign scientist or MNC would be willing to come and work in the city-state for fear of damaging their reputation (Pereira 2006; Elliott 2007).

Singapore's fear of being labeled a ''new wild east'' and its wish to portray itself as a country where unethical scientific practices are strongly discouraged is partly fueled by the negative publicity it has received in major international media outlets. As scholars (Pereira 2006; Holden and Demeritt 2008) have noted, articles have appeared in papers like the *Far Eastern Economic Review, The New York Times*, and *Businessweek* in which Singapore is criticized as being ''too liberal'' in terms of research ethics and a place where any type of research is possible. Singapore has always been keen to dismiss this critique and the way it handled the case of Professor Shovron in 2003 is illustrative of these efforts. Shovron, a prominent British scientist lured to Singapore in 2000, was accused of collecting blood samples without proper consent in late 2002. The Singaporean authorities reacted swiftly, tightening the ethical research framework, sacking Shovron, and depicting him as a ''cowboy'' (Chang 2003). As Professor Lim Pin (cited in Chang 2003) argued, Shovron was one of these ''people trying to do things here [in Singapore] that they know they will not be able to do in their own home country.'' One ''cannot get away with [such] shortcuts in Singapore,'' Professor Lim (cited in Enserink 2003:233) continued, ''[because] we are very protective and jealous about our reputation.''

Given that, for Singapore, the aim of having a bioethical assemblage was to promote its reputation among an international audience, the knowledge, expertise, and techniques that made up this assemblage had to conform to globally recognized standards. This was explicitly stated by the Singaporean government. Trade and Industry Minister George Yeo (2000), for example, argued that Singapore ''must have ethical standards for research which stand up to international scrutiny.'' Similarly, the BAC argued that:

> [We have to] ensure the harmonization of our laws with accepted international best practice… [from] the leading jurisdictions around the world (BAC 2002b: 2–3);

> The harmonization of our national ethics governance framework with that of leading research jurisdictions is of national strategic importance. (BAC 2004:29)

In other words, Singapore had to import a whole system of ethical values—Western biomedical research ethics and bioethics more generally—from Europe and North America. Indeed, the internationally recognized ethical frameworks that Singapore sought to emulate were those that had been developed in ''scientifically advanced countries'' like the United States or the United Kingdom (BAC 2007:9; cf. for example: BAC 2002a:14–20).[4]

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[4]This will to import Western ethical values is in stark contrast to the promotion of Asian values and opposition to undesirable Western norms like human rights that informed Singapore's policies up to the late 1990s (George 2000: chapter 3).

Importing Western research ethics meant, first of all, that Singapore had to address all the ''ethical issues'' deemed of importance to this international audience. To do so, Singapore had to monitor existing internationally recognized bioethical assemblages around the world and make sure that its own assemblage was up to date. It is therefore no surprise that the list of topics tackled by both the NMEC and the BAC—research on human beings; clinical trials; cloning; genetic testing; etc.—is a carbon copy of the catalog of issues addressed by bioethical commissions in other developed countries and by international organizations like UNESCO. Furthermore, Singapore also had to address these different issues using the language, principles, expertise, and technologies that were used in internationally recognized bioethical assemblage and which the international audience who Singapore targeted was familiar with. It is therefore unsurprising that the BAC (2009) described ''research on human biology and behavior and its applications'' as presenting a series of ''ethical, legal, and social issues'' that had to be investigated by a bioethical committee like the BAC. It is also no surprise that research on human beings and their bodies was described by the BAC (2002a:i; 2002b:35; 2004:24–27) as an activity fraught with dangers against which ''all human beings'' had to be protected in the name of ''respect for human life'' and ''respect for the human body'' itself. Similarly, it is unsurprising that the BAC (2002b:8) would suggest, in order to solve these ethical issues, the adoption of ''an ethical and legal regulation'' that would ''provide a firm foundation for the proper and ethical governance of research [on humans and their bodies] in Singapore.'' Likewise it was predictable that Singapore's ethical framework would feature the principle of informed consent and institutional review boards (cf. BAC 2002a,b, 2004). In short, given Singapore's understanding of ethics governance as a mechanism to guarantee its good reputation to an international audience, it is unsurprising that its bioethical assemblage is a carbon copy of similar assemblages in place in North America and Europe.

To import this Western system of ethical values, the Singaporean government did two things. First, it surveyed, monitored, and adopted the ethical standards put forward by key developed countries and recognized international organizations. In the words of George Yeo (2000), Singapore had to ''monitor closely'' and take up ''the ethical standards adopted by leading Life Sciences research centers in the world.'' This pattern of review and reproduction is discernible in both the work of the NMEC and the BAC. So, for example, the NMEC's 1997 *Ethical Guidelines on Research Involving Human Subjects* followed very closely the corresponding regulation in place in Canada and the United Kingdom (Ministry of Health 1998). Similarly, the BAC modeled itself and its reports on comparable organizations and reports published by recognized international organizations like UNESCO and the WHO as well as key Western countries like the United States and the United Kingdom (for example, BAC 2002a: chapter 6; BAC 2002b:21–22, 29, 33). Second, Singapore also hired and consulted numerous international experts in bioethics. So, for example, the Bioethics Advisory Council has an ''International Panel of Experts'' composed of four Western experts in bioethics whose function are, among others, to ''align Singapore with international best practice'' (BAC 2009).[5] A further foreign bioethics expert hired by Singapore is British bioethics pioneer A.V. Campbell who became director of NUS's Centre for Biomedical Ethics and member of the BAC in late 2006.

Conclusion

This article made an original contribution to the sociological and anthropological literature on the globalization of Western research ethics and, more

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[5]The four experts are Martin Bobrow, Bartha Knoppers, Bernard Lo, and Thomas Murrey.

generally, bioethics. Indeed, unlike this literature, it did not attempt to highlight the ''shortcomings'' of biomedical research ethics but, focusing on Singapore, sought instead to identify the conditions of possibility for the dissemination of bioethics in the non-Western world. To do so, the article first described how Western biomedical research ethics—understood as an assemblage of knowledge and practices embodying a particular logic to govern the use of human beings in medical research—was introduced in Singapore from the late 1990s onward. It showed, in particular, how both the NMEC and the BAC were instrumental in developing a bioethical assemblage in a country in which it was hitherto absent. This description provided the basis to determine and trace the genealogy of the intellectual concepts, institutional forms, types of expertise, and techniques of government that made it possible for biomedical research ethics to be introduced and developed in Singapore from the late 1990s onward. Taking this genealogical approach, the article argued that the import of Western research ethics in Singapore was made possible by what I termed the ''will to modernize'': a particular ''style of reasoning'' (Hacking 1992) that has characterized the thinking and acting of the Singaporean leadership ever since the country's independence in 1959. As already alluded to, these conditions of possibility are in stark contrast to the critical attitude toward modern medicine and modernity more generally that, together with networks of doctors, lawyers, and philosophers, allowed for the articulation of biomedical research ethics in the West from the 1960s onward (Stevens 2000; Reubi 2009: chapter 4).

To demonstrate this argument, the article first described the key concepts, institutional forms, and strategies that make up this will to modernize the country when it was first articulated in the 15 years that followed independence. It described, in particular, the conception of modernity-as-economic-development, the belief that it was for government to plan for economic growth by attracting foreign multinational companies, and the strategy to lure these companies by offering them a world-class industrial infrastructure. The article then explained how this will to modernize had allowed for Singapore's efforts to turn the city-state into a world-class hub for biomedical research from the mid-1980s onward. It showed in particular how, for the country's leadership, the life sciences replaced low-skill industries as Singapore's engine of economic development and growth. It also described how the concept of industrial infrastructure was adapted into a technological infrastructure that comprised the physical and soft elements necessary to a knowledge-based economy. Finally, the article explained how biomedical research ethics was adopted and developed as one element of this technological infrastructure, alongside the creation of laboratories and a modern IP system. It also showed how this understanding of a bioethical assemblage as a key part of Singapore's technological infrastructure rests on the assumption that research ethics is vital to ensure the country's reputation among an international audience of foreign scientists and MNCs active in biomedical research. It was in order to reassure this audience that Singapore's governing elite decided to adopt the knowledge, expertise, and techniques that make up Western medical research ethics.

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