The concept of the “Creative University” signals that higher education stands at the center of the creative economy indicating the growing significance of intellectual capital and innovation for economic growth and cultural development. Increasingly economic activity is socialised through new media and depends on immaterial and digital goods. This immaterial economy includes new international labour markets that demand analytic skills, global competencies and an understanding of markets in tradeable knowledges. Delivery modes in education are being reshaped. Global cultures are spreading in the form of knowledge and research networks. Openness, networking, cross-border people movement, flows of ideas, capital and scholars are changing the conditions of imagining and producing creative work. The economic aspect of creativity refers to the production of new ideas, aesthetic forms, scholarship, original works of art and cultural products, as well as scientific inventions and technological innovations. It embraces both open source communication as well as commercial intellectual property. This collection explores these ideas as the basis for a new development agenda for universities.
CREATIVE EDUCATION

Volume 1

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**Scope:**
The knowledge, learning and creative economies manifest the changing significance of intellectual capital and the thickening connections between economic growth, knowledge and creativity. Increasingly economic and social activity is comprised by the ‘symbolic’ or ‘weightless’ economy with its iconic, immaterial and digital goods. This new digital knowledge economy includes new international labor that rely on developments in information and communication technologies (ICTs) that are changing the format, density and nature of the exchange and flows of knowledge, research and scholarship. Delivery modes in education are being reshaped. New global cultures of knowledge and research networks are spreading rapidly. New forms of openness and networking, cross-border people movement, flows of capital, portal cities and intensive development zones all are changing the conditions of imagining and producing and the sharing of creative work in different spheres. At the centre of is the economy/ creativity nexus. But are education systems, institutions, assumptions and habits positioned and able so as to seize the opportunities and meet the challenges? This new series investigates all the aspects of education in (and as) the creative economy in order to extend the dialogue about the relationship between contemporary higher education and the changing face of contemporary economies.
The Creative University

Edited by
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Education and research have been transformed in the development of knowledge economies. The knowledge, learning and creative economies manifest the changing significance of intellectual capital and the thickening connections between on one hand economic growth, on the other hand knowledge, creativity (especially imagined new knowledge, discovery), the communication of knowledge, and the formation and spreading of creative skills in education. Increasingly economic and social activity is comprised by the ‘symbolic’ or ‘weightless’ economy with its iconic, immaterial and digital goods. This immaterial economy includes new international labour markets that demand analytic skills, global competencies and an understanding of markets in tradable knowledges. Developments in information and communication technologies (ICTs) not only define globalization they are changing the format, density and nature of the exchange and flows of knowledge, research and scholarship. Delivery modes in education are being reshaped. Global cultures are spreading in the form of knowledge and research networks. Openness and networking, cross-border people movement, flows of capital, portal cities and littoral zones, and new and audacious systems with worldwide reach; all are changing the conditions of imagining and producing and the sharing of creative work in different spheres. The economic aspect of creativity refers to the production of new ideas, aesthetic forms, scholarship, original works of art and cultural products, as well as scientific inventions and technological innovations. It embraces open source communication as well as commercial intellectual property. All of this positions education at the centre of the economy/creativity nexus. But are education systems, institutions, assumptions and habits positioned and able so as to seize the opportunities and meet the challenges?

The chapters that form this edited book are a selection of papers given at an international conference held called The Creative University held at the University of Waikato on 15-17 August 2102. This conference investigated all the aspects of education in (and as) the creative economy. The conference objective was to extend the dialogue about the relationship between contemporary higher education and the changing face of contemporary economies. A number of terms describe the nature of the contemporary capitalism of advanced economies: ‘cognitive capitalism’, ‘metaphysical capitalism’, ‘intellectual capitalism’, ‘designer capitalism’. The conference explored the relationship between the arts and sciences and this new
form of capitalism. It looked at the global reach and international imperatives of aesthetic and scientific modes of production, the conditions and character of acts of the imagination in the range of fields of knowledge and arts in this period, and the role of the research university in the formation of the creative knowledge that has a decisive function in contemporary advanced economies.

FREEDOM, OPENNESS AND CREATIVITY IN THE DIGITAL ECONOMY

Every aspect of culture and economy is transforming through a process of digitization that creates new systems of archives, representations and reproduction technologies that portend a Web 3.0 and Web 4.0, where all production - material and immaterial - will be digitally designed and coordinated through distributed information systems.

Digitization transforms all aspects of cultural production and consumption, favoring the networked peer community over the individual author and blurring the distinction between artists and their audiences. These new digital logics alter the traditional organization of knowledge, education and culture, spawning new technologies as a condition of the openness of the system. Now that the production of texts, sounds and images is open to new rounds of experimentation and development, a new grammar of digital culture is created. The processes of creativity are then transformed as they are no longer controlled by traditional knowledge institutions and organizations, but rather permitted by platforms and infrastructures that encourage large-scale participation and challenge old hierarchies.

The shift to networked media cultures based on the ethics of participation, sharing and collaboration, involve a volunteer, peer-to-peer gift economy that has its early beginnings in the right to freedom of speech, which depends upon the flow and exchange of ideas as essential to political democracy, and includes the notion of a “free press,” the market and the academy. Perhaps even more fundamentally, free speech is a significant personal, psychological and educational good that promotes self-expression and creativity, as well as the autonomy and development of the self, which is necessary for representation - in a linguistic and political sense - and for the formation of identity.

Openness has emerged as a global logic based on free and open-source software constituting a generalized response to knowledge capitalism and the attempt of the new mega-information utilities such as Google, Microsoft, and Amazon.com to control knowledge assets through the process of large-scale digitization, of information that is often in the public domain, of the deployment of digital rights management regimes and of strong government lobbying to enforce intellectual property law in the international context.

The Internet is a dynamic, open ecosystem that progressively changes its nature towards greater computing power, interactivity, inclusiveness, mobility, scale, and peer governance. In this regard, and as the overall system develops, it begins to approximate the complexity of the architectures of natural ecosystems. The more it develops, one might be led to hypothesize, the greater the likelihood that it will not merely emulate Earth as a global ecosystem, but will become an integrated organic
whole. Open cultures become the necessary condition for the systems as a whole, for the design of open progressive technological improvements and their political, epistemic and ontological foundations.

The other side of the state and corporate digital reproduction of identity is a tendency that emphasizes the relation between openness and creativity as part of a networked group. The “open self” is self-organizing and formed at the interstices of a series of membership in online communities that shape spontaneous self-concept and self-image.

Openness to experience is one of the five major traits that has shaped personality theory since its early development by L.L. Thurstone in the 1930s and is strongly correlated with both creativity and divergent thinking. Sometimes referred to as the “big five” personality traits or “the five factor model,” trait theory emerged as a descriptive, data-driven model of a personality based on openness, conscientiousness, extraversion, agreeableness, and neuroticism. Openness is associated with creativity and the appreciation of art, emotionality, curiosity, self-expression and originality. One of the limitations of personality theory is its focus on the individual: in the age of networks, this centeredness might seem somewhat misplaced. There are close links between open content, open science and open collaboration that makes collaborative creativity sustainable.

Openness to experience is probably the single most significant variable in explaining creativity and there is some evidence for the relationship between brain chemistry and creative cognition as measured with divergent thinking. Openness can also be defined in terms of the number, frequency, and quality of links within a network. Indeed, the mutual reinforcement of openness and creativity gels with Daniel Pink’s (2005) contention that right-brainers will rule the future. According to Pink, we are in the transition from an “Information Age” that valued knowledge workers to a “Conceptual Age” that values creativity and right-brain-directed aptitudes such as design, story, symphony, empathy, play, and meaning.

CREATIVITY AS THE NEW DEVELOPMENT PARADIGM

The contemporary politics of creativity rests on the intersection between art and politics tracing the influence between art and labor in the form of co-creativity and peer collaboration within the new mode of social production. This much, at least in its nascent form, has now been recognized by the United Nations (2008): that there is another reality and narrative emerging that provides an interpretation of “globalization as connectivity” rather than economic integration or free trade and that it is “reshaping the overall pattern of cultural production, consumption and trade in a world increasingly filled with images, sounds, texts and symbols” (p. iii). As the “Overview” of the UN Creative Economy Report 2008 clarifies:

In the contemporary world, a new development paradigm is emerging that links the economy and culture, embracing economic, cultural, technological and social aspects of development at both the macro and micro levels. Central
to the new paradigm is the fact that creativity, knowledge and access to information are increasingly recognized as powerful engines driving economic growth and promoting development in a globalizing world. “Creativity” in this context refers to the formulation of new ideas and to the application of these ideas to produce original works of art and cultural products, functional creations, scientific inventions and technological innovations (p. 3).

The report documents how the concept of the “creative economy is an evolving one that is gaining ground in economic development that “entails a shift from the conventional models towards a multidisciplinary model dealing with the interface between economics, culture and technology and centred on the predominance of services and creative content”. The report adopts the UNCTAD definition of the “creative economy”, which can be summarized as follows:

- The creative economy is an evolving concept based on creative assets potentially generating economic growth and development;
- It can foster income generation, job creation and export earnings while promoting social inclusion, cultural diversity and human development;
- It embraces economic, cultural and social aspects interacting with technology, intellectual property and tourism objectives;
- It is a set of knowledge-based economic activities with a development dimension and cross-cutting linkages at macro and micro levels to the overall economy;
- It is a feasible development option calling for innovative multidisciplinary policy responses and interministerial action;
- At the heart of the creative economy are the creative industries

The notion of “creative economy” has grown out of earlier discussions of the “knowledge economy” and signals those sectors that are the most dynamic in terms of world trade with an average annual growth rate of over 8 per cent in the period 2000-05 and representing 3.4% of world trade in 2005 (or $424.5 billion). The development dimension of the creative economy is summarized in the call for a systematic approach to national innovation: “With the increasing knowledge intensity of the contemporary economy and the need for innovation to maintain competitive advantage, it has become imperative for countries to tap into their vast reserves of creativity” (p. 5). The report sees an opportunity for developing countries to access global markets to sell products of their creative and cultural sectors thus enhancing the relationship between development and culture, and realization of the Millennium Development Goals (MDGs) including the eradication of extreme poverty. The creative economy approach I seen as being consistent with MDGs as it provides a holistic and multisectoral approach that goes beyond economics and includes cultural and social frameworks. The UNCTAD commits to the notion of creative economy in its 2010 Report and the capacity of “creative industries” centered at at the crossroads of the arts, culture, business and technology to generate creative skills, income through trade and intellectual property rights.
This mainstream neoclassical economic orientation endeavors to understand the economic aspect of creativity through its contributions to entrepreneurship, and the ways in which it fosters innovation, enhances productivity and promotes economic growth.3

For creativity studies might also follow the debates in the literature on “cognitive capitalism” to focus on the side of labor rather than capital and begin to interpret this in the light of “biopolitics” and see it signaling, “the moment that the traditional nation/State dichotomy is overtaken by a political economy of life in general,” where “power has invested life” to create “sites of the production of subjectivity” privileging, “the transformation of work in the organization of labor”(Negri, 2008: 13-14). Antonio Negri investigates the organization of labor under neoliberal globalization and the radical transformation of the production process though new processes of self-regulation and expressive creativity unleashed by information and communication technology that facilitates the rise of what Negri and others call “immaterial labor” (after Karl Marx’s “general intellect”) as the dominant productive force that takes place with the development and cultivation of new laboring subjectivities.

A manifesto for education in the age of cognitive capitalism must address the question of new laboring subjectivities and their cultivation, socialization and
education (Peters et al, 2009). In this case we can take our as our starting point the “creative energy of labor”. As Negri (2008: 20) argues:

In the Fordist era, temporality was measured according to the law of labor value: Consequently it concerned an abstract, quantitative, analytic temporality, which, because it was opposed to living labor time, arrived at the composition of the productive value of capital. As it is described by Marx, capitalist production represents the synthesis of the living creativity of labor and of the exploitative structures organized by fixed capital and its temporal laws of productivity. In the era of post-Fordism, on the contrary, temporality is no longer - nor totally - enclosed within the structures of constant capital: as we have seen, intellectual, immaterial, and affective production (which characterizes post-Fordist labor) reveals a surplus. An abstract temporality - that is to say, the temporal measure of labor - is incapable of understanding the creative energy of labor itself (our emphasis).

As the United Nations’ Creative Economy Report (2011) makes abundantly clear a new development paradigm is emerging that links the economy and culture, embracing economic, cultural, technological and social aspects of development. Creativity, knowledge and access to information are central to this new paradigm. These factors are increasingly recognized as powerful engines driving economic growth and promoting development in a globalizing world. Helen Clark, the UN Administrator writes in her Foreword to the Report: “In this era of transformation, creativity and knowledge are fast becoming powerful means of fostering development gains.”

What roles do or should universities play in this new model of development? The age of the creative university has only just begun. The state of Western universities—US, UK and European (Eurozone)—are in a great period of upheaval and turmoil, driven by a funding crisis, “austerity” cuts to higher education, and another round of increases in student tuition fees. In this fiscally mean environment public universities are under attack and especially vulnerable as various forms of parallel privatization begin further to dismantle national systems that took generations to build. State support for universities is steadily shrinking as governments encourage closer university-business partnerships and radical forms of outsourcing and digital, long-distance learning solutions. Against the backdrop of a continuing world recession the public mission of the university is being questioned and reframed as Western governments emphasis the responsibility of the university to contribute to and drive economic growth. Economic justifications for the existence of universities are overshadowing its traditional missions as a critical institution engaged in the process of political and social transformation, the development of disinterested scholarship, and the promotion of national and global citizenship.

By contrast, Asia’s universities are rising. As John O’Leary4 demonstrates already “Asian universities fill four of the top five places in a new table of young universities extracted from the 2011/12 QS World University Rankings to demonstrate their
INTRODUCTION

growing power.” This is in part the global environment in which the future of the university should be situated. The survival of the university at the level of national system and individual institution will depend largely on how it interprets and responds to these trends. Increasingly, for Western universities this means nurturing the existing links, exchanges, and academic flows from American and European universities systems and institutions while developing strategic links with Asia’s leading institutions, especially China, Taiwan, and Korea, those countries that have invested strongly in expanding the university sector. In this respect the development of “export” education and the international student market is no longer sufficient. What is required is the development of strategic partnerships both at the institutional and national levels with possibilities of joint degrees, faculty and student exchanges, off-shore and outsourced learning, elearning and digital infrastructures for international study, transnational higher education centers, and leveraging of collaborative research initiatives in areas of strength and specialization. This environment conditions the mood of the “new pragmatism”. Above all, individual universities and those policy makers who design and guide national systems need to position their institutions for the long term in relation to fundamental changes in the mode of knowledge production and in academic and social media that favors a flexible approach to notions of creativity and to the age of the creative university.

NOTES


3 See the UNCTAD website on creative economy at http://unctad.org/en/Pages/DITC/CreativeEconomy/Creative-Economy-Programme.aspx.

4 See http://www.topuniversities.com/where-to-study/region/asia/rise-asia%E2%80%99s-young-universities

REFERENCES

THE CHANGING GEO-POLITICS OF CREATIVITY

Rise of the Post-Confucian University

Abstract: The paper explores the dynamic evolution of higher education and research in East Asia in China, Hong Kong SAR, Taiwan China and South Korea, and in South East Asia in Singapore. It refers also to the earlier case of Japan where higher education developed rapidly in the 1960s/1980s, and Vietnam where the take-off has yet to occur. While there are important differences between them, these systems, termed here ‘Post-Confucian’, share (1) a common heritage, in the comprehensive role of the Sinic state (as distinct from the limited liberal state of the English-speaking world) and Confucian educational traditions in the family and examination system; (2) an accelerated response to Western modernization. Post-Confucian higher education and research is becoming as strong or stronger than that of Western Europe, in terms of investment, participation rates and published science. High citation impact is increasing rapidly in some fields of knowledge such as Engineering, Chemistry and Computing. The Post-Confucian Model of higher education is both distinctive in its dynamics and one that other countries may try to imitate. The paper explores the drivers of the Model and the possible limits; and some implications for the comparative study of higher education, and for social theory.

INTRODUCTION

The last two decades have seen a major expansion in the worldwide role of higher education. This mega-trend, uneven by region, is associated the three other mega-trends in modernization: the relative growth of knowledge intensive work, urbanization, and the expansion of the middle class. The capitalist economy continues to absorb pre-capitalist rural sectors in Asia, Africa and Latin America. The proportion of the world population in cities has passed 50 per cent. The European Union Institute for Strategic Economic Studies estimates the size of the global middle class (persons with $10–100 US dollars a day) will increase from 1.8 billion in 2009 to 4.9 billion in 2030, over half the world’s population (Vasconcelos, 2012, pp. 28–30). The majority of growth in the middle class will be in Asia, mainly China and India, from half a billion persons in 2009 to over three billion persons in 2030. The new members of the middle class will want higher education for their children.
The expanding role of higher education is manifest in three principal trends. The first is the growth of participation. Between 2000 and 2010 the world Gross Tertiary Enrolment Ratio (GTER) rose from 19 to 29 per cent. In East Asia and the Pacific it rose from 16 to 29 per cent, though it was still only 17 per cent in South and West Asia (UNESCO, 2012).

The second trend is the growth of research science. All nations now need a developed capability in science and technology, though not all can afford to pay for it; just as they need clean water, stable governance and a globally viable financial system. They need universities that can ‘participate effectively in the global knowledge network on an equal basis with the top academic institutions in the world’ (Altbach, 2011, p. 11). Nations and cities that lack the capacity to interpret and understand research, a capacity that necessarily rests on trained personnel themselves capable of creating research, will find themselves in a position of continuing dependence. The common growth of research is sustained by the globalization of knowledge within the one-world English language science system, and takes the competitive form of an ‘arms race in innovation’, as nations move to secure advantages through investment in R&D. Global research rankings continually compare nations’ performances and signify their competitive positions. Between 1995 and 2009 Asia’s annual output of science papers grew rapidly, from 77,000 to almost 190,000, 147 per cent, while world output grew by 39 per cent. In quantity terms, though not quality, research in Asia is close to the United States, the world leader in science (NSF, 2009).

The third trend, associated with the second, is the global pluralization of capacity in higher education and science. Advanced provision is no longer largely confined to North America and Europe: 48 countries published over one thousand science papers in 2009, 26 per cent more than in 1995 (NSF, 2012). The science countries are distributed across North America, Europe, Asia, Latin America and Africa and the Middle East. Table 1 has details. But the headline story is the rise of East Asia. China, Hong Kong SAR, Taiwan, Korea, and also Singapore in Southeast Asia, have joined Japan as high participation high science systems. As a group these systems will soon produce more published science than the whole of Europe. These systems, plus Vietnam, can be termed the ‘Post-Confucian systems’. The countries are different from each other in many ways, including language and political cultures, and there are certain tensions between them. Nevertheless, they have four common features that have facilitated the take-off: the comprehensive Sinic state, Confucian education in the home, an effective response to Western modernization, and economic growth sufficient to pay for educational infrastructure and research.

The chapter focuses on the dynamics of these Post-Confucian higher education systems. It traces the material outlines of their development, analyzes the conditions and drivers, and theorizes their dynamism and possible limits. It closes by comparing Post-Confucian higher education with the Anglo-American systems, and reflects on implications for the study of comparative higher education, and for social theory.
Table 1. Nations Publishing more than One Thousand Science Papers in 2009

<table>
<thead>
<tr>
<th>ANGLO-SPHERE</th>
<th>EUROPEAN UNION</th>
<th>NON-EU EUROPE</th>
<th>ASIA</th>
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<td>USA 206,601</td>
<td>Germany 45,003</td>
<td>Russia 14,016</td>
<td>China 74,019</td>
<td>Brazil 12,306</td>
<td>Iran 6313*</td>
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<td>UK 45,649</td>
<td>France 31,748</td>
<td>Switzerland 9469</td>
<td>Japan 49,627</td>
<td>Mexico 4123</td>
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<td>Canada 29,017</td>
<td>Italy 26,755</td>
<td>Turkey 8301</td>
<td>Sth. Korea 22,271</td>
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<td>Australia 18,923</td>
<td>Spain 21,543</td>
<td>Norway 4440</td>
<td>India 19,917</td>
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<td>Egypt 2247</td>
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<td>New Zealand 3188</td>
<td>Netherlands 14,866</td>
<td>Ukraine 1639</td>
<td>Taiwan 14,000</td>
<td>Malaysia 1351*</td>
<td>Tunisia 1022*</td>
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<td>Sweden 9478</td>
<td>Serbia 1173*</td>
<td>Singapore 4169</td>
<td>Pakistan 1043*</td>
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<td>Poland 7355</td>
<td>Croatia 1164*</td>
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<td>Slovakia 1000</td>
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* = countries that have entered the one thousand papers group since 1995
Source: adapted from NSF, 2012
Typically the Post-Confucian systems progress rapidly in both the quantity and quality of schooling and higher education. All are moving towards universal participation at tertiary level. The Gross Enrolment Rate exceeds 85 per cent in South Korea and Taiwan. Macau SAR is at 65 per cent and Japan and Hong Kong SAR are both at 60 per cent (UNESCO, 2012). Hong Kong SAR and Singapore have shifted away from the non-universal systems inherited from Britain. In China, participation was less than 5 per cent in 1990. It was 26 per cent in 2010 (UNESCO, 2012) and the target for 2020 is 40 per cent, which would bring the nation close to the OECD average. In China the quality of institutions varies. Some argue that many tertiary graduates are poorly prepared for work in high technology manufacturing: one recent report refers to ‘low-skill glut and high-skill shortage’ in graduate labour markets (World Bank, 2012a, p. 194). The leading universities have been singled out for accelerated improvement to global standard in research. The challenge is to improve other institutions and lift participation in the poorer provinces.

So far the Post-Confucian systems have avoided the trade-offs between advances in educational quality and advances in quantity that seem endemic to Anglo-American systems. They also avoid trade-offs between public and private financing. Government and households share the cost of expanding participation. As Post-Confucian systems mature, the proportion of tuition paid for by the household rises; and the state focuses an increasing part of its funding on academically elite national research universities and their students, and in some cases social equity objectives. A feature of Post-Confucian systems – in marked contrast to the European world – is that many very poor families invest heavily in the costs of schooling and extra tutoring and classes outside formal school. Families can spend as much on education as American families spend on housing. In Korea 77.7 per cent of all costs of tertiary education institutions are paid by the private sector, including 52.1 per cent by households, with just 22.3 per cent by government. In Japan the private sector share is 66.7 per cent (OECD, 2011, p. 244). Government pays for about 40 per cent of costs in China. The spending on extra schooling in its different forms is remarkable. Levin (2011) estimates that in Korea it exceeds 3 per cent of GDP.

Research Science

In East, Southeast and South Asia together – Asia minus the Middle East and former Soviet Central Asia – total investment in R&D was $402 billion in 2009, 31.5 per cent of the global total. It was not far short of the $433 billion in North America and well ahead of the $319 billion in Europe. South Korea invested 3.36 per cent of GDP in R&D in 2010, Japan 3.32 per cent and Taiwan 2.93 per cent, levels similar to the Scandinavian countries, the world leaders, and ahead of the US (2.88 per cent).
China invested 1.70 per cent of GDP in R&D. The national target is 2.5 per cent by 2020. If R&D spending continues to expand by 20 per cent a year (NSF, 2012) China’s investment will exceed the USA in the next decade. As in Korea, a relatively low proportion of China’s research budget goes to universities, one yuan in ten, but university research is expanding along with other R&D, and universities access more government-source monies by partnering state enterprises.

Increased investment in research has led to a dramatic growth in Post-Confucian scientific output. China, the world’s 12th largest producer of science and quantitative social science in 1995, was second in 2009 with 74,019 papers. It passed Japan in 2007. Since the year 2000 China’s annual output has grown by 17 per cent per year. When the world’s largest nation expands research at unprecedented rates over a prolonged period, knowledge flows are decisively changed. In South Korea the growth of science has been almost as rapid, reaching 22,271 papers in 2009. This was larger than India’s output (19,917) though India has thirty times the population of Korea. There has also been rapid growth in Taiwan and Singapore. Scientific output has plateaued in Japan, with 49,627 papers (NSF, 2012), as in the US and UK. All three established a mature research system prior to the 1990s.

World-Class Universities

National governments in East Asia and Singapore place a high priority on developing a layer of leading universities, or ‘World-Class Universities’ (WCUs), concentrations of status and research comparable to those of North America and UK/Western Europe. WCU policy builds on pre-given national hierarchies, like the Imperial universities established prior to World War 2 in Japan; Peking University (1898) in China; and Seoul National University (1946) which was the first national university in Korea. There are some recent foundations, such as the Hong Kong University of Science and Technology (HKUST), which opened in 1991 (Postiglione, 2011). Would-be WCUs are supported by special investment funding such as the 985 program in China and Brain 21 in Korea (Shin, 2009).

How strong are the leading Post-Confucian universities, in measured research outcomes, compared to North America and Europe? One way to answer this question is to consider the position of Asian universities in global rankings based on publication and citation counts. These counts are drawn from the two principal global data bases of bibliometric information: Thomson-ISI Web of Science (2012), and Scopus from Elsevier.

Research rankings data have limitations. They exclude the humanities and the arts, largely exclude the non-quantitative social science and professional disciplines, and mostly exclude work in languages other than English. They consider the impact of research in other science literature but not its impact in economies and societies. In addition, multi-indicator rankings are governed by arbitrary weightings between different elements, which exercise an undue influence on the Times Higher (2012) and QS (2012) placements. Single indicator tables based on transparent performance
data, like the Leiden (2012) and Scimago (2012) tables, based respectively on Web of Science and Scopus, are more helpful. The Leiden ranking also provides field normalization. Citation rates are adjusted to take account of different rates of citation by field. For example papers in Medicine typically has more authors and cite more comprehensively than do papers in Engineering.

The Shanghai Jiao Tong ranking, which uses Web of Science plus the winners of Nobel Prizes and Field Medals in Mathematics, is the most useful multi-indicator ranking because the elements in the index correlate closely. It is also the ranking with broadest credibility. The Shanghai top 200 list is dominated by the United States (89 universities) and the rest of the Anglo-sphere (34). Most others are from Western Europe. Asia has 14 of the top 200 universities including nine from Japan. In the top 100 are the research powerhouses of Tokyo (21st) and Kyoto (27th), strong in Physical Sciences and mathematics, plus Osaka, Nagoya and Tohoku. These are the only top 100 universities in Asia. The Shanghai top 200 includes four more Japanese universities, and the National University of Singapore, Seoul National, National Taiwan (the highest ranked Chinese university), Tsinghua in China and the Chinese University in Hong Kong. There are no top 200 Asian universities from outside the Post-Confucian group (SJTUGSE, 2012).

China is not strong in the Shanghai top 200, but between 2005 and 2011 the number of top 500 universities in mainland China increased from 8 to 23 (SJTUGSE, 2012). Hong Kong has five more. Given the surge in research in China, why are not there more universities in the world top 200? First, rankings are zero-sum. Absolute improvements in a university’s performance are not enough. It must displace the established leaders, which are normally improving also, and this takes time. Second, the use of the Nobel indicators disadvantage university systems with a recent tradition of leading edge science, like most of those in Asia. Third, there are lags between investment in research capacity and scientific output, between publication and citation, and between citation and change in the rankings. Today’s additional investments in R&D will show up in rankings in 10–15 years. By then there will be many more Chinese and Korean universities in the world top 200.

The Shanghai ranking also lists the top 100 institutions in five research fields. Outside Japan performance in Life Sciences and Medicine is modest, though this may be changing in Singapore and Hong Kong. But there are nine Post-Confucian universities in the top 100 in Physical Sciences and 22 in Engineering. China has ten in Engineering, including four in Hong Kong, led by HKUST at 36th in the world. There are three in Taiwan, led by National Taiwan University, a major player in computing, at 29 (SJTUGSE, 2012).

The comparative performance of Post-Confucian systems can also be monitored using the Leiden CWTS (2012) ranking. Leiden provides separate indicators of paper quantity, and the proportion of papers in the top 10 per cent most highly cited papers in their field, a quality indicator. (Here the gold standard is MIT, with 25.2 per cent of its papers in the top 10 per cent by citation rate). Table 2 lists the Asian universities producing more than 6000 papers in the 2005–2009 period, all
Table 2. Universities in East Asia and Singapore by Volume of Scientific Papers, 2005–2009, Universities with more than 6000 Papers Only

<table>
<thead>
<tr>
<th>Institution</th>
<th>Volume of science papers 2005–2009</th>
<th>World rank on paper volume</th>
<th>Proportion of papers in top 10% most cited in field</th>
</tr>
</thead>
<tbody>
<tr>
<td>U Tokyo JAPAN</td>
<td>18,382</td>
<td>4</td>
<td>10.2</td>
</tr>
<tr>
<td>Kyoto U JAPAN</td>
<td>14,941</td>
<td>11</td>
<td>9.5</td>
</tr>
<tr>
<td>Seoul National U SOUTH KOREA</td>
<td>13,052</td>
<td>19</td>
<td>8.9</td>
</tr>
<tr>
<td>Zhejiang U CHINA</td>
<td>13,037</td>
<td>20</td>
<td>9.1</td>
</tr>
<tr>
<td>Osaka U JAPAN</td>
<td>12,266</td>
<td>25</td>
<td>8.1</td>
</tr>
<tr>
<td>National U Singapore SINGAPORE</td>
<td>11,838</td>
<td>29</td>
<td>13.8</td>
</tr>
<tr>
<td>Tohoku U JAPAN</td>
<td>11,736</td>
<td>30</td>
<td>7.9</td>
</tr>
<tr>
<td>Tsinghua U CHINA</td>
<td>11,478</td>
<td>34</td>
<td>10.8</td>
</tr>
<tr>
<td>National Taiwan U TAIWAN</td>
<td>11,302</td>
<td>35</td>
<td>8.9</td>
</tr>
<tr>
<td>Shanghai Jiao Tong U CHINA</td>
<td>10,683</td>
<td>40</td>
<td>8.2</td>
</tr>
<tr>
<td>Peking U CHINA</td>
<td>9153</td>
<td>53</td>
<td>10.4</td>
</tr>
<tr>
<td>Kyushu U JAPAN</td>
<td>8462</td>
<td>62</td>
<td>6.8</td>
</tr>
<tr>
<td>Hokkaido U JAPAN</td>
<td>8043</td>
<td>71</td>
<td>6.1</td>
</tr>
<tr>
<td>Yonsei U SOUTH KOREA</td>
<td>7399</td>
<td>79</td>
<td>7.8</td>
</tr>
<tr>
<td>Nagoya U JAPAN</td>
<td>7203</td>
<td>87</td>
<td>8.1</td>
</tr>
<tr>
<td>Nanyang Technological U SINGAPORE</td>
<td>7136</td>
<td>90</td>
<td>11.9</td>
</tr>
<tr>
<td>National Cheng Kung U TAIWAN</td>
<td>7126</td>
<td>92</td>
<td>8.5</td>
</tr>
<tr>
<td>Fudan, U CHINA</td>
<td>7061</td>
<td>94</td>
<td>11.1</td>
</tr>
<tr>
<td>Tokyo Institute Technology JAPAN</td>
<td>6932</td>
<td>99</td>
<td>8.3</td>
</tr>
<tr>
<td>U Hong Kong HONG KONG SAR</td>
<td>6820</td>
<td>103</td>
<td>11.5</td>
</tr>
<tr>
<td>U Science &amp; Technology China CHINA</td>
<td>6789</td>
<td>107</td>
<td>13.0</td>
</tr>
<tr>
<td>Nanjing U CHINA</td>
<td>6584</td>
<td>114</td>
<td>10.7</td>
</tr>
<tr>
<td>Shandong U CHINA</td>
<td>6087</td>
<td>130</td>
<td>7.6</td>
</tr>
<tr>
<td>Chinese U Hong Kong HONG KONG SAR</td>
<td>6029</td>
<td>131</td>
<td>10.1</td>
</tr>
</tbody>
</table>

Source: adapted from Leiden University CWTS, 2012
Post-Confucian. Eight are from Japan, eight from China and there are two each from South Korea, Taiwan, Hong Kong and Singapore.

This list includes large national flagship universities such as Tokyo and Kyoto, Peking and Tsinghua, Taiwan National, Seoul National and NUS in Singapore. In world terms, these institutions are stronger on paper volumes than citation rates, especially the Japanese universities (CWTS, 2012). But some Post-Confucian systems have developed middle-sized universities specializing in science and technology with strong citation rates (Table 3), led by HKUST – with a citation rate of 58th in the world only twenty years after foundation – and the private Pohang University (‘Postech’) in Korea. Of the 23 institutions above the 10 per cent mark on citation, 12 were from China, five from Hong Kong SAR, two each from Singapore and South Korea, and one each from Taiwan and Japan.

The standout is the National University of Singapore. It is a very large producer of science, sixth in Asia and 29th in the world on paper volume, and also strong in citation rate, 83rd in the world on this measure. NUS is ahead of all Australian universities on both quantity and quality. Nanyang University in Singapore also performs well (CWTS, 2012).

The quantity and quality measures can be combined, by listing world universities with more than 5000 papers and at least 10 per cent of papers in the top tenth in their field. Citation is dominated by US universities and there are 64 US universities on the list, plus 47 universities in Europe. There are just 12 from East Asia and Singapore: Tokyo, NUS and Nanyang in Singapore, KAIST in Korea, Hong Kong University and the Chinese University in Hong Kong, and six from China: Tsinghua, Peking, Fudan, Science and Technology, Nanjing, Jilin. National Taiwan and Seoul National Universities fall below 10 per cent. In Asia Pacific 20 universities meet the volume target but not the citation target (CWTS, 2012). As quality and citation lift, the region will look more like Europe.

Another ranking is the webometrics (2012) measure of Internet connectivity. Asian universities have eight of the world top 100, led by National Taiwan at 42 and Tokyo at 46. Taiwan has five of the top 11 universities in Asia. Taiwan’s leading industries are computing-related and research in Computing and Electrical Engineering are very strong.

**DYNAMICS OF THE POST-CONFUCIAN MODEL**

Beginning with Japan in the 1960s/1980s, followed by Taiwan, Korea and Singapore in the 1990s, and China in the last decade, the Post-Confucian systems have achieved three objectives simultaneously: the generalization of participation, partly financed by families; the rapid growth of research science; and world-class universities. No other system of higher education and research has moved forward at this pace on all three fronts at the same time. Moreover, the Post-Confucian systems have done it within low tax polities. In 2007 government spending as a proportion of GDP was less than 15 per cent in Hong Kong SAR, Japan and Taiwan, 19.3 per cent in China.
### Table 3. Universities in East Asia and Singapore with more than 10 per cent of Their Papers in the Top 10 per cent of the Field, 2005–2009

<table>
<thead>
<tr>
<th>Institution</th>
<th>Volume of science papers 2005–2009</th>
<th>Proportion of papers in top 10% most cited in field</th>
<th>World rank on this citation measure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hong Kong U S&amp;T (HONG KONG SAR)</td>
<td>3568</td>
<td>14.9</td>
<td>58</td>
</tr>
<tr>
<td>Pohang U (SOUTH KOREA)</td>
<td>3264</td>
<td>14.1</td>
<td>76</td>
</tr>
<tr>
<td>National U Singapore (SINGAPORE)</td>
<td>11,838</td>
<td>13.8</td>
<td>83</td>
</tr>
<tr>
<td>Nankai U (CHINA)</td>
<td>4211</td>
<td>13.4</td>
<td>98</td>
</tr>
<tr>
<td>U Science &amp; Technology (CHINA)</td>
<td>6789</td>
<td>13.0</td>
<td>113</td>
</tr>
<tr>
<td>City U Hong Kong (HONG KONG SAR)</td>
<td>3903</td>
<td>12.7</td>
<td>123</td>
</tr>
<tr>
<td>Lanzhou U (CHINA)</td>
<td>3531</td>
<td>11.9</td>
<td>160</td>
</tr>
<tr>
<td>Nanyang Technological U (SINGAPORE)</td>
<td>7136</td>
<td>11.9</td>
<td>166</td>
</tr>
<tr>
<td>U Hong Kong (HONG KONG SAR)</td>
<td>6820</td>
<td>11.5</td>
<td>182</td>
</tr>
<tr>
<td>Korea Advanced Institute S&amp;T (SOUTH KOREA)</td>
<td>5319</td>
<td>11.4</td>
<td>196</td>
</tr>
<tr>
<td>Fudan U (CHINA)</td>
<td>7061</td>
<td>11.1</td>
<td>213</td>
</tr>
<tr>
<td>Sun Yat-sen U (CHINA)</td>
<td>4481</td>
<td>10.9</td>
<td>220</td>
</tr>
<tr>
<td>Tsinghua U (CHINA)</td>
<td>11,478</td>
<td>10.8</td>
<td>229</td>
</tr>
<tr>
<td>Nanjing U (CHINA)</td>
<td>6584</td>
<td>10.7</td>
<td>236</td>
</tr>
<tr>
<td>East China U of S&amp;T (CHINA)</td>
<td>2393</td>
<td>10.7</td>
<td>244</td>
</tr>
<tr>
<td>Hong Kong Polytechnic U (HONG KONG SAR)</td>
<td>4579</td>
<td>10.5</td>
<td>256</td>
</tr>
<tr>
<td>National Tsing Hua U (TAIWAN)</td>
<td>4011</td>
<td>10.5</td>
<td>259</td>
</tr>
<tr>
<td>Peking U (CHINA)</td>
<td>9153</td>
<td>10.4</td>
<td>265</td>
</tr>
<tr>
<td>Xiamen U (CHINA)</td>
<td>2501</td>
<td>10.3</td>
<td>270</td>
</tr>
<tr>
<td>U Tokyo (JAPAN)</td>
<td>18,382</td>
<td>10.2</td>
<td>284</td>
</tr>
<tr>
<td>Jilin U (CHINA)</td>
<td>5072</td>
<td>10.2</td>
<td>285</td>
</tr>
<tr>
<td>Chinese U Hong Kong (HONG KONG SAR)</td>
<td>6029</td>
<td>10.1</td>
<td>287</td>
</tr>
<tr>
<td>Wuhan U (CHINA)</td>
<td>4590</td>
<td>10.0</td>
<td>298</td>
</tr>
</tbody>
</table>

Source: adapted from Leiden University CWTS, 2012
and 20.8 per cent in Korea (ADB, 2010). This compares with public spending near 50 per cent of GDP in some European nations.

How was this done? What are the conditions and drivers? As noted the key elements are economic growth; inherited political and educational cultures in the comprehensive Sinic state, and Confucian educational practices at home and in the examination system; and modernization pressures together with the effective response of Post-Confucian states.

**Economic Growth**

All Post-Confucian systems except China and Vietnam are in countries with European or higher levels of wealth (Table 4). This provides the necessary private and public resources to finance the Model. China has doubled average income in the last five years. Education-strong Shanghai, Beijing and Eastern China are wealthier than most of the nation.

**The East Asian state**

The Sinic state originated in the Qin and Han dynasties 2200 years ago. It spread to Korea and then Japan in the next millennium. The Qin and Han states were responsible for social harmonization, and common systems such as language and measurement, while day to day management of the rural economy was devolved to the local level. Compared to Europe the state was stronger viz a viz the towns (city-states played

<table>
<thead>
<tr>
<th>Nation/system</th>
<th>GNI PPP per capita USD $s</th>
</tr>
</thead>
<tbody>
<tr>
<td>Singapore</td>
<td>55,790</td>
</tr>
<tr>
<td>Hong Kong SAR</td>
<td>47,480</td>
</tr>
<tr>
<td>Macau SAR (2009)</td>
<td>45,220</td>
</tr>
<tr>
<td>Taiwan China</td>
<td>35,700</td>
</tr>
<tr>
<td>Japan</td>
<td>34,610</td>
</tr>
<tr>
<td>South Korea</td>
<td>29,110</td>
</tr>
<tr>
<td>China</td>
<td>7,640</td>
</tr>
<tr>
<td>Vietnam</td>
<td>30,700</td>
</tr>
<tr>
<td>United States</td>
<td>47,310</td>
</tr>
<tr>
<td>Australia</td>
<td>36,910</td>
</tr>
<tr>
<td>India</td>
<td>3400</td>
</tr>
</tbody>
</table>

PPP = Purchasing Power Parity.
Source: adapted from World Bank, 2012b; CIA, 2012
a minor role in East Asia), and the occupational and social sectors. In East Asia politics has always been supreme:

The development of the political sphere in the Chinese world and its pre-eminence over all the others (military, religious, economic) is one of its most characteristic marks … because of the pre-eminence of the political function – the organization of living space and society – economic activities could not attain in China, any more than religious or military activities, the same degree of autonomy or specificity as in other civilizations… one of the constants and one of the great original aspects of the Chinese world, one that distinguishes it from all others. (Gernet, 1996, pp. 28–29)

The comprehensive and centralizing Sinic state followed a different path to the Romans state, the absolutist European states, the limited liberal state of Locke and Adam Smith, and the French revolution. The limited liberal state demarcates state executive and judiciary, market and civil order. Politics turns on the tensions between them. The state’s right to intervene is habitually questioned. Civil society is larger than in East Asia. In contrast East Asians mostly accept the generic state as supervisor of society and social conduct (Wei-ming, 1996). Dissidents rarely rail against the legitimacy of state action as such. They call on the state to discharge its responsibilities in a proper manner, to behave as a state should behave. China is much changed since economic liberalization in 1978. The extra-state sphere is expanding (Zang, 2011). But the role and standing of the state in East Asia and Singapore remains qualitatively different to all Western states. Sinic states have long-term historical agendas – whether the polity is single-party or multi-party, there is continuity in the bureaucracy – and apply central intervention selectively to achieve specific purposes. And in all Post-Confucian societies, except Hong Kong, government as a vocation has higher standing than in the UK or USA. Many of the best and brightest graduates from top universities head for state office, not the professions or business.

Whereas in the US, universities are often understood as part of civil society, or the market, in East Asia and Singapore it is impossible to imagine them (or society) in the absence of the state. Even private higher education is regulated as within government responsibility. The Sinic state has fostered the conditions for takeoff in higher education, because it sees education and research as essential to economic growth and global effect.

Confucian Education at Home

The Confucian family-based commitment to self-cultivation via learning was first installed among the Han dynasty elite and established on a broad basis under the Song a thousand years later. In Post-Confucian countries respect for education is longer and more deeply rooted than in Europe and North America, where mass education dates from the nineteenth century. Prior to the Western intervention in Japan, school
participation, especially among females, was equal to or greater than anywhere in Europe. The 11,000 village schools provided a strong basis for modernization in the Meiji period (Henshall, 2007, p. 43).

Education is understood as part of the duty of child to parent and the duty of parent to child. It is the source of personal virtue, of social standing and of meritocratic advance. The family and individual schooling are joined to social ordering by the ‘one-off’ examination systems that select students into the leading universities. Examinations were first developed on a modest scale for the preparation of Han state officials and were later consolidated under the Tang and Song. The competition is now universal and the stakes higher than ever. Families stop at little to achieve success. Family investment and student workloads tend to increase over time, despite widespread concerns about the effects.

Modernization from Outside and In

East Asian higher education is also shaped by norms and models from European and North American education, especially the US research university – as re-interpreted by governments in East Asia and Singapore that operate as ‘global competition states’ (Cerny, 1997). Since Meiji Japan, catch-up with the West has been a major or dominant policy driver, though competition with other Asian nations is also increasingly important.

The Post-Confucian systems of higher education and research are East-West hybrids. They are also something new: a distinctive Post-Confucian modernization in the university sector. They combined inherited traditions with external drivers of modernization that are articulated and reinforced by Post-Confucian states; states that themselves combine long-standing Sinic perspectives and practices with more Western and globally generic precepts of economic supervision and government, such as New Public Management (NPM) techniques. It is mistake to see Western modernization as displacing educational or political tradition in East Asia. The relation between tradition and modernity is one of exchange, not of displacement. This is not to say they are in stable equilibrium. Post-Confucian states continually attend to the balance between external norms and national cultural identity: a national identity inherited, constructed and undergoing continuous transformation. State-fostered modernization and market forces do not always sit easily with state-fostered harmonization. These elements are more readily reconciled amid strong economic growth. The expansion of educational opportunities for the growing number of middle class families contributes to social harmony, and is politically essential.

All Post-Confucian states use internationalization strategies to open schooling and higher education to continuous modernization and lift performance in global terms. Singapore, with its Global Schoolhouse, is the best known example. Internationalization programs are central in the peak universities in China (Wang, Wang & Liu, 2011;
Salmi, 2011, p. 326), Hong Kong SAR and Taiwan, and are implemented in Japan and Korea, though more readily in some private universities than the state sector. Korea, Japan, Taiwan and China especially focused on US examples but all Post-Confucian systems link also to Western Europe. The strategies include policy goals based on global rankings, which embody the norms of Anglo-American universities; recruitment of scientists and scholars from the diaspora; English in degree programs, especially PhDs; global science publishing; and cross-national benchmarking. All systems send some personnel abroad for doctoral training. Hong Kong SAR and Singapore more readily employ foreign faculty than do Japan and Korea. Japan subsidizes large-scale student entry (the current target is 300,000 students) to build local competence in European languages while acculturating foreign students in Japanese language and culture, though these goals are in tension. There are concerns that internationalization programs are yet to break down national insularity.

The combination of state-managed external drivers and reform programs, Confucian education at home, and examination competition, is potent in building student learning achievement. The 2009 OECD PISA survey (see Table 5) found that East Asia and Singapore constitute the world’s strongest zone for student learning (OECD, 2010). In mean student scores in Mathematics, the top five systems in the world were all Post-Confucian: Shanghai (600), Singapore (562), Hong Kong SAR (555), South Korea (546), Taiwan (543). The Post-Confucian systems performed almost as well on Science, with five of the top six systems, including Japan in fifth place, and Reading with four of the top five systems. Only Finland exhibited

<table>
<thead>
<tr>
<th>Reading</th>
<th>Mathematics</th>
<th>Science</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shanghai China</td>
<td>Shanghai China 600</td>
<td>Shanghai China 575</td>
</tr>
<tr>
<td>South Korea</td>
<td>Singapore 562</td>
<td>Finland 554</td>
</tr>
<tr>
<td>Finland</td>
<td>Hong Kong SAR 555</td>
<td>Hong Kong SAR 549</td>
</tr>
<tr>
<td>Hong Kong SAR</td>
<td>South Korea 546</td>
<td>Singapore 542</td>
</tr>
<tr>
<td>Singapore</td>
<td>Taiwan 543</td>
<td>Japan 539</td>
</tr>
<tr>
<td>Canada</td>
<td>Finland 541</td>
<td>South Korea 538</td>
</tr>
<tr>
<td>New Zealand</td>
<td>Liechtenstein 536</td>
<td>New Zealand 532</td>
</tr>
<tr>
<td>Japan</td>
<td>Switzerland 534</td>
<td>Canada 529</td>
</tr>
<tr>
<td>Australia</td>
<td>Japan 529</td>
<td>Estonia 528</td>
</tr>
<tr>
<td>Netherlands</td>
<td>Canada 527</td>
<td>Australia 527</td>
</tr>
<tr>
<td>USA equal 15th 500</td>
<td>UK 28th 492</td>
<td>UK 16th 514</td>
</tr>
<tr>
<td>UK equal 25th 424</td>
<td>USA 31st 487</td>
<td>USA 23rd 502</td>
</tr>
</tbody>
</table>

Source: Adapted from OECD, 2010
comparable levels of performance. Post-Confucian governments explicitly focus on strategies designed to maximize PISA performance.

In sum, the Post-Confucian Model rests on the long-standing division of labour between state and family, unique in higher education, in the context of economic growth, and state-driven social harmonization and modernization, including the use of global competition and models. Without driving state intervention with its capacity to set real policy goals and achieve them, there would have been no Post-Confucian takeoff in higher education. At the same time, the family is the bedrock social institution. For a time in China the pervasive political role of the party-state weakened the family but post-1978 liberalization has seen a reassertion of non-state institutions (Zang, 2011, pp. 175–177). In education, without the tradition of Confucian learning at home, sustained by meritocratic hope amid relentless social competition, state policies would have had less purchase. In some respects higher education in the English-speaking nations and Western Europe is more state dependant in the economic sense, while more independent of state ordering in the political sense. Family educational motivations are less universal and the state’s role as financial guarantor of participation is essential to mass education. In East Asia, because all households fund part of tertiary costs, and the family and social competition together drive increasing participation, this frees up more state resources for infrastructures, globally-focused research universities, research project work, and high achieving personnel. On this basis the Post-Confucian systems have moved forward at the same time at a rapid rate on the quantity of participation and quality of institutions, while creating a layer of leading universities with varied missions, and building the volume and quality of research science with extraordinary rapidity. The last is the most striking achievement of the Model.

American approaches to system-building and institution-building dominate ideas about higher education and science, unsurprising given the US has half the top 100 research universities and half the 1 per cent most cited papers. Forms typical of Anglo-American higher education have been absorbed into the design of most ranking systems. The success of the Post-Confucian higher education and research and of the Post-Confucian school systems in PISA, and the association with rising China, suggests that the Post-Confucian Model will become an influential alternative model for emerging systems. Nevertheless, wholesale policy borrowing will not work, except in Vietnam. Even if other systems can replicate the focused state policy, because they lack a Confucian educational culture in the family they will be unable to replicate the essential state/family symbiosis.

Limits of the Post-Confucian Model?

There are possible limits to the effectiveness of the Post-Confucian systems in relation to research quality, university autonomy and academic freedom. There is also the apparent stagnation of universities in Japan, and the failure of the Model to take root in Vietnam.
Research Quality

Overall Post-Confucian research citation falls below world average rates. In 2010 China, Japan and the Asia-8 (Korea, Taiwan, Singapore, India, Thailand, Malaysia, Indonesia, the Philippines) together produced 21.9 per cent of all science and social science papers, but only 10.6 per cent of those in the top 1 per cent on citation. The US produced 27.8 per cent of papers and 48.9 per cent of the top 1 per cent. China published 7.5 per cent of papers but only 3.6 per cent of the top group (NSF, 2012). The patterns are uneven by discipline. In Engineering, Chemistry, Computer Science and Mathematics, China’s share of all papers and top 1 per cent papers is much higher than its overall standing. In Engineering China has 12.5 per cent of all papers and 12.3 per cent of the top 1 per cent, compared to 38.5 per cent in the US; in Chemistry China has 10.6 per cent of the top 1 per cent. The Asia-8, led by Korea, Taiwan and Singapore, also perform strongly in these disciplines. On the other hand, in Medicine and Biological Sciences China has less than 1 per cent of the world’s top 1 per cent of papers, while the US has more than half (NSF, 2012).

However, the most striking aspect is the rate of change. In 2000 China had 0.6 per cent of the top 1 per cent most cited Chemistry papers; ten years later in 2010, its share was 10.6 per cent (NSF, 2012). One suspects that if the Chinese state wants to energize research in Life Sciences and Medicine with the same intensity as research for energy, construction, urban design, communications and transport, rapid progress will be achieved.

University Autonomy and Academic Freedom

If the Post-Confucian state and family appear as stronger institutions than in the West, civil society and institutions between state and family, such as the university, appear weaker. To generalize (for there are exceptions) the university is less independent, less entrepreneurial and more directly tied to policy agendas. Nevertheless, in these systems there is a common movement towards NPM corporatization with greater institutional autonomy over budgets, priorities, staffing and international relations – though Taiwan has yet to see corporatization reform – and a common shift from direct to indirect steering via funding formulae, incentives, performance management, accountability and audit. In these changes the Post-Confucian states, like Western states, retain the capacity to secure their objectives. The NPM trend to managed autonomy has not disturbed the foundations of the Model. The state remains an active supervisor. Universities in East and West have moved in parallel towards the NPM template while maintaining the distinctions between them.

China’s system of dual university leadership, where the party secretary sits alongside the president, has ambiguous potentials for institutional autonomy. At worst it operates as continuous official interference in academic judgment. At best it is a form of distributed leadership that buffers the direct role of the party-
state and secures partial institutional autonomy, as in Min Weifang’s tenure as party secretary at Peking University (Hayhoe, et al, 2011, pp. 111–114). Perhaps the larger concern about university autonomy in China is that both positions are appointed from above, though by different branches of the party-state. Some scholars of higher education in China argue openly for selection of leaders by the governing bodies of the university rather than the state (e.g. Wang, et al, 2011, pp. 42–43). In one-party Singapore university councils now choose their presidents, though it would be unthinkable they would choose a leader at loggerheads with the government.

Recurring tensions between universities and regulation are part of all higher education systems. What is distinctive about the Post-Confucian systems is that the state is a larger factor than in English-speaking countries and parts of Europe. This cuts both ways. When states are building investments and capacity, they strengthen the positive freedom and the agency of universities and their leaders, all else being equal. At the same time more comprehensive states have greater scope for interference and coercion that would reduce negative freedom. When the state focuses on doing more with less, as in Japan in the last decade, it can bear down hard (Oba, 2007). This problem can occur in any system: it is a matter of degree. A larger concern about Post-Confucian systems is the potential for the state to intervene in research planning and resourcing, cutting across peer judgment in the disciplines. State intervention may be justified to break down opaque and unresponsive peer cultures that resist transparency and the globalization of knowledge. However, once modernization is achieved, peer cultures are more effective than states in shaping creative work. It is difficult for the Post-Confucian states to step back. As long as research is treated as a branch of state it is open to symbolic political manipulation, talent capture and even economic corruption, as evidenced in the recurring debates about cronyism in China. Singapore has worked hard to manufacture intellectual autonomy. The Hong Kong polity still bears the mark of the British limited liberal state and provides its universities with considerable room to move, making the SAR particularly attractive to foreign talent.

What about academic freedom? Resources affect the capacity to exercise freedoms. The economic instrumentalism common to all Post-Confucian systems (and many others) weakens the humanities and humanistic social sciences vis a vis the applied sciences and technologies. Political repression also affects freedoms. There is no blanket repression of criticism in the Post-Confucian world, but dissent is expressed in distinctive ways. Issues openly debated or subject to ritualistic angst in the United States are often debated inside the party/state in China, including the universities, which are part of the broad state. The atmosphere in leading universities is often liberal and there is more academic engagement in policy issues than in, say, the UK. Yet open public criticism occurs less frequently than in English-speaking systems because by definition it confronts state legitimacy. In Chinese tradition scholars with a responsibility to serve the state are obliged to criticize the state when it departs from the path of legitimate conduct. They openly challenge the regime not whenever
they disagree but only when they believe it has lost the mandate to govern. This
generates acts of individual courage that can trigger state repression, a recurring
pattern throughout the history of China and one that can affect social scientists and
humanists today. Such acts of criticism are not ‘Western-style assertions of freedom
against the state, but consistent with Sinic tradition and Post-Confucian order.
Debate is more open in Korea, Taiwan and Japan but it still takes courage to defy the
state and conservative peers.

Meanings of ‘university autonomy’ and ‘academic freedom’ vary between cultures.
There is a universal component – in all systems faculty like making decisions on
their own behalf – and a culturally variant element. In the Post-Confucian world,
the autonomous personality of the university is mostly expressed on behalf of
government not against it. Likewise, academic freedom is understood in terms of
authority and responsibility:

Once one can excel in terms of productivity and meet the State’s criteria for
producing valuable and useful knowledge, one may enjoy a high level of
intellectual authority. This type of intellectual authority is not identical with
academic freedom in the Western context, but in some ways it provides even
more flexibility and greater power than does academic freedom. There is
certainly some overlap between these two concepts, yet clearly a different
emphasis. Westerners focus on restrictions to freedom of choice, whereas
Chinese scholars looking at the same situation focus on the responsibility of
the person in authority to use their power wisely in the collective interest (Zha,
2011, 464).

Hayhoe (2011, p. 17) notes ‘a strong tradition of “intellectual freedom” in China’
with foundations different from those of European rationalism. ‘It requires that
knowledge be demonstrated first and foremost through action for the public good’,
and that knowledge is ‘holistic and inter-connected’ not organized in ‘narrowly
defined separate disciplines’.

Do these cultural differences, and/or the potentials for state repression, limit
research outputs? It is unlikely that the relative quantity of scientific output is
affected. Do they narrow collective imagining in the humanities? The jury is out.
Post-Confucian knowledge is not wholly nation-bound. These systems will develop
new humanistic scholarship that embodies both indigenous and global influences, as
is already the case in the arts.

**Japan and Vietnam**

Japan was the archetypal Post-Confucian system of higher education and research
until the 1990s. Post-Confucian dynamism has now vanished (Marginson, 2010).
Participation rates may increase, facilitated by demographic downturn, but Japan
is fine-tuning institutions not building new capacity. Households continue to invest
but government funding is no longer increasing. Scientific output and industrial
technology remain strong but research outputs are no longer growing. Longstanding weaknesses in the universities – conservative academic cultures, near closure to foreign talent, lack of conversational English in global forums – remain (Newby et al, 2009). State modernization strategies seem to lack energy and élan. Does it indicate a limit to the Post-Confucian Model or factors specific to Japan?

The slowdown of the Japanese economy is a brake. More fundamentally, Meiji catch-up to the West was achieved by the 1980s. The state has not created a new driver for system modernization and capacity building to replace the Meiji agenda. Whereas China, and Korea, once achieving catch-up, may develop a new forward global agenda, Japan has not. This suggests the limit lies in the Japanese state, not the Post-Confucian Model per se.

The Confucian legacy seems as widespread among families in Vietnam as in other Post-Confucian countries. Universal examinations are used for selection. There is strong normative commitment to schooling and respect for the teaching profession. There is household investment through private tutoring and foreign tertiary institutions, and since 1986 part-cost fees have been charged in public education. Those who buy extra tuition enjoy advantages (London, 2006, pp. 13–14). However, of the elements of the Model – state steering, targeted system-building, Confucian education in the family, examinations, rapidly growing participation underpinned by state-financed infrastructure and household spending, accelerated research – only the first, third and fourth are clearly present. Vietnam has the cultural conditions but lacks the political conditions. The nation has only half the per capita income of China and government is unable or unwilling to make the necessary investment. As in Japan, the failure of dynamism appears to lie in state policy. Nevertheless, the Vietnamese state has shown a formidable military capacity, its national role remains strong, China is on the northern border, and economic growth is running at 5 per cent plus per annum. It may be only a matter of time before Vietnam adopts the Model.

Implications for Theorization

Finally, the Post-Confucian Model of higher education and research, and the evident plurality of practices and norms in system-building that are confirmed by the Model, have implications for both the study of comparative higher education and for social theory.

Comparative Education

Table 6 summarizes and compares the respective features, conditions and dynamics of the Post-Confucian systems, the US system, and the Westminster systems in UK, Australia and New Zealand. No one should perpetuate the illusion that all nations and institutions operate on the same basis, any more than they operate on an equal
Table 6. Comparison of Post-Confucian and English Language Country Systems

<table>
<thead>
<tr>
<th>Character of nation-state</th>
<th>Post-Confucian systems (East Asia &amp; Singapore)</th>
<th>United States’ system</th>
<th>Westminster systems (UK, Australia, NZ)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Educational culture</td>
<td>Confucian commitment to self-cultivation via learning.</td>
<td>Twentieth century meritocratic and competitive ideology. Education common road to wealth/status, within advancing prosperity</td>
<td>Post 1945 ideology of state guaranteed equal opportunity through education as path to wealth and status, open to all in society</td>
</tr>
<tr>
<td>State role in higher education</td>
<td>Big. State supervises, shapes, drives and selectively funds institutions. Over time increased delegation to part-controlled presidents</td>
<td>Smaller, from distance. Fosters market ranking via research, student loans. Then steps back. Autonomous presidents</td>
<td>From distance. Policy, regulation, funding supervise market, shape activity. Autonomous vice-chancellors</td>
</tr>
<tr>
<td>Financing of higher education</td>
<td>State financed infrastructure, part of tuition (especially early in model), scholarships, merit aid. Household funds much tuition and private tutoring, even poor families</td>
<td>State funds some infrastructure, tuition subsidies, student loans. Households vary from high tuition to low, poor families state dependent</td>
<td>Less state financed infrastructure now. Tuition loans, some aid. Growing household investment but less than East Asia. Austerity</td>
</tr>
<tr>
<td>Dynamics of research</td>
<td>Part household funding of tuition, ideology of WCU, university hierarchy: together enable rapid state investment in research at scale. Applied is dominant. State intervention.</td>
<td>Research heavily funded by federal government unburdened by tuition. Industry and philanthropic money. Basic science plus commercial IP.</td>
<td>Research funded (more in UK) by government, also finances tuition. Less philanthropy than US. Basic science, applied growth, dreams of IP</td>
</tr>
<tr>
<td>Hierarchy and social selection</td>
<td>Steep university hierarchy. ‘One-chance’ universal competition with selection into prestige institutions. WCUs are fast track for life</td>
<td>Steep institutional hierarchy mediated by SAAT scores. Some part second chances, mainly public sector. Top WCUs are fast track for life</td>
<td>Competition for place in university hierarchy mediated by school results with some part second chances. WCUs provide strong start</td>
</tr>
<tr>
<td>Fostering of World-Class Universities</td>
<td>Part of tradition, universal target of family aspirations. Support for building of WCUs by funding and regulation. Emerging global agenda</td>
<td>Entrenched hierarchy of Ivy League and flagship state universities, via research grants, tuition hikes, philanthropy. Source of global pride</td>
<td>Ambivalence in national temperament and government policy on status of top institutions. Private and public funding hit ceilings</td>
</tr>
</tbody>
</table>

Source: author

> For 300 years, all of humanity has certainly become more closely linked to one another through colonialism, unequal trade and technological development. Yet a common path hardly exists between the colonizer and the colonized, between Africa and the US, or between China and the European powers’ (Wang, 2009, p. 85).

Comparative higher education struggles with real world diversity. Comparison needs a common framework for analysis (sameness), but must also maximize the space in which specificity (difference) is visible. These goals are in tension. Comparative education walks a path between homogenization and ultra-relativism. The field tends to err on the side of homogenization. Most analytical work in the sub-discipline, particularly in the US and the leading European powers, imposes a single norm of system design as the template against which all systems are evaluated. Typically the norm is undeclared and based on the scholar’s own higher education system. The approach is comparative but nation-bound: liable to underplay elements from other nations that fall outside the template, and global relations across national borders. Often the effect is also neo-imperial, as national systems are positioned as inferior copies of the master system (Marginson & Mollis, 2001).

Normative frameworks determine knowledge in social science. They are not the only factor in play; observed data have irreducible material foundations. But the template used for comparison determines not only which data can be visible but which questions can be asked. If the template is the US system it is clear that Chinese universities have insufficient autonomy to make strategic decisions and are too influenced by foreign benchmarks to be mature institutions. If the template is the Post-Confucian system it is clear American families are not insufficiently committed to learning and the state has little focus on system improvement. Questions significant in one framework are less significant in the other.

Comparative education needs to identify the plurality of system models, to render transparent the possible analytical schemas and analyze each system from more than one vantage point. Phenomena significant from several different vantage points then take an added importance, facilitating generic global analysis. What elements are significant when tracking variations between systems? Neo-institutional theory suggests one key to he dynamics of different higher education systems is nation-state forms and the associated political cultures. The Post-Confucian systems highlight the additional importance of educational cultures, which intersect with political systems while retaining an autonomous dynamic. Other elements include modes of governance, leadership and organization in higher education; relations between state, universities and society; financing and cost sharing; and global openness, engagement and initiative, including the contribution of each higher education system to the architecture of global relations in higher education.
Observation suggests that different systems often appear regional, reflecting historical overlaps and clustered cultures. Space prevents a full discussion here, but regional systems include not only the Post-Confucian, Westminster and United States’ models, but also the Nordic (Valimaa, 2011); Central European or Germanic; Francophone; Latin American (Marginson, 2012), South Asian, and the model of Saudi Arabia and the Gulf States.

The Term ‘Post-Confucian Model’

An earlier paper by the author used the term ‘Confucian Model’ for higher education systems in East Asia and Singapore (Marginson, 2011b). Responses to that paper indicated that ‘Confucian’ carried meanings unintended by this author. Respondents, especially those from East Asia, endorsed the description of East Asian-specific cultural elements and agreed that these systems have a distinctive developmental trajectory. But some critiqued the term ‘Confucian’ as a form of cultural essentialism, reflecting prior usage in historical-cultural analysis and the business studies literature. It was never the intention to define all East Asian phenomena or educational phenomena as ‘Confucian’. Cultural practices are not singular or fixed. Higher education and research in East Asia and Singapore are a complex, open and moving hybrid. They have been shaped by many locational cultural and political elements, and closely affected by the Western imperial intervention and more contemporary models, especially the US research university. The term ‘Confucian’ was designed not to provide a bounded or universal explanation in the manner of, say, Hofstede’s (1980) cultural categories; still less to imply the countries of East Asia and Singapore are ‘the same’ in all respects; but to emphasize one distinctive and strategic feature of all higher education in the region: the continued salience in the family of Confucian practices of education as self-cultivation and social advancement. The potency of this factor, and its commonality across the region, are generally agreed.

‘Post-Confucian’ carries less unwanted baggage than ‘Confucian’. It creates more space for the hybridity with Western universities and global science. It is more accurate.

Social Theory

The foregoing account of the Post-Confucian higher education systems may also have implications for social theory. In Table 6 the differences between systems highlight the role of cultural factors. A political economy framework tends to flatten out qualitative differences nested in cultural practices. For example, in 2010 the public/private cost ratio in higher education was much the same in the US, China and Australia. It might be concluded that the respective roles of the private sector and the state were similar in each case. This would miss Confucian practices in the home, which in the longer run are likely sustain a larger role for household investment in China than Australia, and even higher learning achievement per government dollar. It
would also miss differences in the modalities through which state power is exercised. Australian and American states buy influence through budgetary allocations and have a modest direct authority in the private sector. In China the state places greater reliance on its customary authority and secures considerable regulatory purchase over activities that are largely privately funded.

This does not mean a relativist cultural analysis should replace the generic political economy analysis. Both are needed. Together their analytical power is maximized. In a world in which political economies are globally convergent, cultural practices are a medium in which political economic practices are articulated in varied ways. Tu We-Ming remarks in *Confucian Traditions in East Asian Modernity* (1996): ‘Culture matters … economic facts and political institutions are laden with cultural values’ (pp. 4–5). The two dimensions are constantly in interplay, in analysis as in the world. Sinic political cultures underpin state investment in research. The accumulation of wealth provides material conditions for Confucian educational practices in their modern form. And so on.

The differences between Post-Confucian and Anglo-American practices of academic responsibility and freedom, and university autonomy, are also suggestive. Notions of power/knowledge and modes of government might have to be rethought. Post-Confucian scholars have both more and less agency than their American counterparts. In Sinic states the Gramscian distinction between coercion and hegemony may need reconfiguration. Consider also Foucault’s distinction between sovereignty and governmentality: in China and Singapore the two are blended in ways novel for the governmentality theorist. Modes of social and cultural capital might differ in East Asia. In other words, some European and American theories that claim a universal character are more regional and historically nested than they imagined themselves to be. This is equally true of Sinic concepts.

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Abstract: Knowledge is a form of objectivation. It involves the positing of objects in the world. Viewed from this angle, the contemporary research university is an object producer. But how well does it do this? The paper reflects on the conditions under which intellectual object production occurs. And considers whether the practices of digital and open-peer production have improved or deteriorated intellectual production? The evidence to date suggests that digital means of production reduces some of the costs associated with intellectual production. On the other hand, in the era when the digitisation of production and peer production models spread, both the quality and the seriousness of intellectual production have declined. The case example of cultural and social theory is explored against the background of a long-term multi-decade decline in the arts and the sciences. The reasons why this has happened and continues to happen are discussed. Digitisation is not culprit but it is not the corrective either. In trying to explain what might be the corrective, the paper returns to some socio-cognitive fundamentals. In particular it considers the role of ‘inspiring environments’ in mediating intellectual object creation. This view is in part drawn from the tradition of John Dewey, Robert Park, and George Herbert Mead. The paper will suggest that part of the reason for the measurable and chronic decline of the contemporary research university has been the widespread failure of universities in the last half century to provide an adequate aesthetic ecology of the mind.

THE OBJECT WORLD

Knowledge is a form of objectivation. It involves the positing of objects in the world. Any such knowledge is contained principally in objects that exist in the world rather than in the mind. There is something to the notion that humankind creates itself, though not in a Romantic sense. Thus I do not mean that humankind creates its own organs; any more than it legislates the laws of physical nature. What humanity does do, though, is create its own environment that it overlays on nature. It creates its own ecology. This artifice, often literally composed in bricks and mortar, is the product of the mind, yet it is external to the mind. The human world is the mind objectivated. This world is outside each of us. We encounter it. We stumble over it. It has a reality
that is independent of each one of us. At the same time, though, it is laced with
meaning. Chairs or roads are not simply physical artefacts, though they are that; they
are simultaneously meaningful objects. This is because humanity’s environment,
and the knowledge that is embodied in that ecology, is shaped by human actions and
objectivations that are symbolic. This environment is part-physical, part-biological,
and part-social; each part of it is transformed in some way by human works, whether
it is nature into landscape or the human body into posture and stance. Simply because
we make this world does not mean that we control it. It has independence from us
just as much as the natural substratum on which we work does.1

Every artefact that we produce is both itself and it stands for something else.
The road is a means of transportation and a symbol of freedom. The chair is a
technology for sitting on and a sign of homeliness. Nothing in non-human nature
is comparable with this. Humankind creates its own environment – a second-
order environment or artifice – through the medium of the imagination. We know
something by understanding it. Understanding is the faculty we have for decoding
the meaning of a thing (action or event). When we learn, we struggle with the
meaning of a thing until we understand it. Once it makes sense, we move onto the
next thing that we have to learn. For something to make sense we have to decode
what it is and what it stands for. Anything that the human mind creates or produces
had an in-itself and for-itself quality. The plumber’s apprentice has to learn to place
piping in a wall cavity. The complement of this is the human imperative to hide its
waste. One of the key things that distinguish human learning is that it is objectified
in things. Animal species ‘learn’ in the sense that they adapt to nature, and a portion
of the fruits of that adaption is passed on to later generations by the modification of
genetic coding and instincts. Human learning is different. Human beings ‘adapt’ to
the world by adding to and modifying the object world that they inhabit. Every act
amongst the infinite acts of production and creation of the object world that goes
on ceaselessly around us carries with it a component of knowledge that is sutured
into the human ecology. A single human being, even the brightest, can know only
so much. By objectivating knowledge in the world, we pool our knowledge. Every
time we encounter a problem to solve, we can reason about it. If that doesn’t work
we can look at the object-world and draw analogies from it. We are constantly
inspired by the examples of what others have created. In that sense, we are what
we make.

In a similar vein, Barry Allen (2004: 173, 184, 195, 228, 229) argues that human
neurology depends on the artefacts we posit. This is quite unlike animal neurology.
As is well-known, among the hominids, the human species was distinguished by
the enlargement of its brain. This offered *homo sapiens* the facility of billions of
billions of additional neural connections. But to make those additional connections
useful, they had to be ordered. The many additional possible pathways needed
models of architectonic structure. And that was provided extra-genetically – by
human artefacts and built environments. The plastic object world that human beings
create for themselves – *eccentrically* as Helmut Plessner (1970), the philosophical
anthropologist, put it so beautifully – is a key source of the neural order, organization and coherence that provides the significance, the structure of meaning that underpins human knowledge and its being-in-the-world. The better that plastic order is, that is to say the more beautiful it is, the better are the neural structures that process the information engendered by the infinite multitude of experiences that human beings have. Experiences are only good if they can be translated into coherent experience. That requires order and structure, and the object world that human beings make acts back upon them to provide that essential source of neural structure. The object world of human making reaches its peak in aesthetic objects. It is not surprising that the earliest human tools were as much aesthetic creations as they were utilities. There is a circle that unites making, knowing, order and aesthetics.

The notion that what we know is what we make is an old view. Thomas Hobbes and Francis Bacon asserted it and it dates to antiquity. It was almost eclipsed in the second half of the twentieth century as analytic and deconstructive, structural and cultural, post-structural and post-Marxian schools of philosophy and sociology became fascinated by linguistic and discourse models of society. Although they were also touched by the fascination with language, the most durable counterpoint to the enchantments of discourse was a formidable strand in North American philosophy that extended from John Dewey and George Herbert Mead (1934) via the philosophical Pragmatists and the Chicago School of Sociology and that absorbed along the way subtle influences from Hegel and Simmel coalescing into a tradition or attitude that still resonates in latter-day figures such as Barry Allen (2004) and Richard Sennett (1977, 1990). The Chicago School sociologist Robert Ezra Park’s notion of the social ecology of the city (1922, 1950) exemplifies this tradition. Another later North American sociologist, the Austrian-American Peter Berger (1967a, 1967b), also made a significant contribution to the counter-tradition. Though he drew some things from the well-spring of the American school of symbolic interaction, especially from Mead, Berger primarily drew from a European stream that originated in Hegel’s idea of objectivation (Versachlichung) and that flowed through various currents of philosophical anthropology that culminated in Plessner’s wonderful idea of human eccentricity and that is evident in works like Agnes Heller’s The Power of Shame (1985). What Park and all the rest supposed was that objects, things and artefacts, including the collective artefact of the city, are humankind’s principal medium of meaning and communication and the most important medium of knowledge. The French leftist writer Régis Debray argued something similar in Transmitting Culture (2004).4

One of the implications of this view is that we do not learn principally through instruction or communicative action but through productive and constructive action. We learn by making. What we make is our human environment – and knowledge is an endless transaction between the subject who makes and the object that is made. In the sense that turns a noun into a verb, we artifice and edifice. The further assumption of all of this is that whatever we make has a material aspect. We don’t just produce matter. We produce meaning simultaneously. When we say ‘that matters’, we mean
that it has meaning. Yet whatever has meaning has a material aspect. It is never just ethereal. The spirit is always embodied. It is always made flesh. No object that human beings produce is immaterial. One of the less convincing theories of recent decades was Negri and Hardt’s (2000) notion of immaterial labour. When digital technologies began to supercede pre-existing modes of mechanical production in the 1990s, much of the explanation of this development took the form of one or other version of discourse theory. Older theories, anchored in economics, and ranging from Marx to Hayek, were pushed aside by this. Digital media, it was assumed, was weightless in the sense of virtually costless to transport, replicate and manipulate. That digital objects exist only because of a heavy-weight bevy of computers, servers, network lines or transmitter towers, storage units, display devices, not to forget offices and campuses, confutes the notion of immaterial labour. The notion, widespread in the contemporary study of media, that digitization immaterializes media is unconvincing. The view arises from an ignorance of the science and technology, and the physical nature, of digital media.

Digital media are material. Like all human-shaped matter, that material is also metaphysical. The inter-relationship between materiality and meaning is such that one presumes the other. Each is dependent on the other. In other words, the cultural meaning of the digital cannot be reduced to vapour. The switching of electric current on/off (the substratum of digitality) occurs in physical matter and is a material phenomenon that is capable of being shaped and formed into physical objects, and through that shaping and forming (e.g. by formatting and coding) is capable of bearing meaning. Meaning is built up in layers on the basis of the physical contrast of current switched on and off. Conversely, material things insofar as they have been shaped have meanings. To the lazy mind, a vinyl record might appear to have more physicality than a MP3 audio file, but in fact, as Fletcher (2009) demonstrates, an MP3 file is just as much of an artefact as the vinyl record. It is an object with grain and patina. It has a physical history, substrate and limits of its own. It is replete with the effects and consequences of material inscription, physical storage and material display. In short, data is physical electro-magnetic matter that is shaped by formats, codes, applications, interfaces, software and hardware. In virtue of this, it is artefactual. It is stored, processed and edited like other material objects, all of which in light of their forming and shaping bear meaning.

Human economies exist because of artefactual objects. Artefactual objects create the conditions for economies. Take the example of economies of storage. To date I have owned two iPods for storing audio files, an 80GB iPod, which I filled, and presently a 120GB iPod, which I will soon fill. Physical storage of data is never enough. Because it is material it occupies space, it has a cost and a price and the ever-present challenge – scientific, technological, economic, and social-emotional challenge – of making the storage unit more efficient. The storage of physical data is a function of compression algorithms and the limits of physical compression. The greater the file compression, the more that aesthetic issues arise. Is the audio file
BEAUTIFUL MINDS AND UGLY BUILDINGS

storage designed for the MP3 player better or worse than other audio storage systems? Is the mobile listening aesthetic of the MP3 player with its massive storage capacity and high compression algorithms to be compared with the older mobile Walkman CD aesthetic of larger audio files, higher fidelity but much lower storage capacity? How do we make aesthetic judgments across these technical divides? Can we make judgements that cross such divides? Is the experience of one commensurable or not with the other, in the same sense that was the experience of listening to the radio commensurable or not with the experience of listening to the turntable?

THE ASPHYXIATION OF THE MIND

The digitization of intellectual objects has innumerable advantages. The principal advantages are those of distribution and consumption. Servers and computing devices have made access to and consumption of human knowledge much quicker, easier, more convenient and more efficient. No one pines for the days when a person spent hours travelling to and from libraries, and more hours installed at desks in those libraries, just in order to read a journal article. To be able to download and store articles and books cheaply has revolutionised human access to knowledge notably by reconfiguring the transport factor radically. Digitization has done for the economics of knowledge what the steam engine did for the costs of transporting goods and people in the nineteenth century. It has also had some impact on the cost of the manufacture of intellectual artefacts though not to same extent that the machine did when it revolutionised by industrialising the manufacture of goods from the late eighteenth century onwards. The digital reproduction of books and articles and other intellectual artefacts like recorded music or films is cheaper, quicker and more efficient than older mechanical means of reproduction, and the economies of scale are much more impressive, either for small-scale or large-scale reproduction. Nonetheless there is a fundamental limit to the effects of digitization on intellectual production. One might call this the limit of ingenuity.

The intellectual object is very easily transported and reproduced digitally. But the production of the object in the first instance is not the same as its carriage or its reproduction. The mass carriage and replication of intellectual objects by digital means affects markedly the economics of distributing and consuming intellectual artefacts. It reduces some of their inherent costs and it expands certain kinds of markets (and with them consumers and audiences) for certain kinds of intellectual artefacts. But this does not mean that intellectual production, as opposed to carriage or reproduction, is better, richer, deeper, greater, or even cheaper than in the pre-digital age. In fact, the converse is true. As reproducibility has exploded in the digital era, core intellectual productivity has declined. The generation of high-level intellectual production per capita has dipped in the period since the onset of the digital age in the early 1970s. It may or may not be that digitization caused this dip, or even co-caused the dip, but at the very least it did not stop a dip occurring.
Elsewhere I have given a number of illustrations of the decline in high-level intellectual output that occurred in the era of the ‘information age’ and the ‘knowledge society’ (Murphy, Marginson, Peters, 2010, 87–138; Murphy, 2012). Here I will confine myself to a particular example. One of the most influential fields in the humanities and social sciences in the twentieth century was that of cultural theory. It incorporated works of many, and arguably most, of the prominent thinkers of the twentieth century. Most of the great philosophers, sociologists, and literary critics and theory-driven historians, economists and anthropologists of the twentieth century contributed to the field. Yet like so many fields across the spectrum of human knowledge, the energy and productivity of cultural theory visibly waned in the later decades of the century. The loss of energy and output, and the corresponding decline per capita in the number of high-levels in the field, is measurable and clear. I am going to use here, as the base-line for measurement, a standard encyclopaedic handbook of the cultural theory field, Ellis Cashmore and Chris Rojek’s *Dictionary of Cultural Theorists* (1999). If this was a larger study, I would have followed the exhaustive example of Charles Murray (2003) who profiled fields by drawing on multiple handbooks of this kind. Every dictionary-style or encyclopaedia-style handbook has idiosyncratic inclusions and exclusions. Drawing on multiple volumes cancels out such idiosyncrasies. Two caveats though to that: I have read virtually all of the works cited as ‘main works’ in the Cashmore and Rojek volume and observed not much unrepresentative eccentricity either by the editors or the sixty-two contributors to the volume. Further, I am not doing the more difficult thing that Murray does which is to list and rank major figures in the field. I am just concerned with the gross dynamics of the field across time.

The evidence drawn from the *Dictionary of Cultural Theorists* is that the cultural theory field exhibits the kind of decline that other commentators have observed dogging technology innovation across the later decades of the twentieth century and the first decade of the twenty-first century (Mandel, 2009; Cowen, 2011). Core intellectual production, the kind that embodies discovery at the highest level, is quietly asphyxiating. The *Dictionary of Cultural Theorists* listed 618 ‘major works’ by cultural theorists. Each dictionary entry on an individual theorist typically listed three and up to six ‘major works’. The earliest work listed was from 1792; the most recent from 1998. Cultural theory as a field of inquiry was seeded in the nineteenth century and 46 of the listed ‘major works’ came from that era. The rest, 572, provide the principal data for what follows. Across the twentieth century, we can analyse the number of major cultural theory works produced per decade as a function of the combined population size of the major countries responsible for cultural theory works across the century: the United States, the United Kingdom, France, and Germany. The resulting data shows a rise in intellectual production per capita from the 1900s to the 1970s, and then a fall off. The figure for the 1990s was adjusted upwards by 15% as the *Dictionary*, understandably given its 1999 publication date, listed no ‘major works’ for 1999 and a partial listing only for 1998.
The decline since the 1970s cannot be attributed to field-specific factors – as the
domain of cultural theory draws from multiple disciplines. It is a litmus signature
of energies across the humanities and social sciences. The peak of cultural theory
output in the twentieth century was 1973. The Dictionary lists 16 ‘major works’
that year. It might be just a coincidence that email, the first popular application of
networked computing was devised by Ray Tomlinson in 1972 and that the Transport
Control Protocol (TCP) for the inter-networking of packet-switched computer
networks was devised by Vinton Cerf and Robert Kahn in 1974. Then again it might
not be a coincidence. I am not quite going to say that the Internet destroyed cultural
theory. On the other hand I am not going to say that it does not share a certain kind
of responsibility for the decline in the intensity of intellectual creation in the second
half of the twentieth century. What the passion for the Internet did, and what its
acolytes continue to do, is to shift attention away from the production of intellectual
objects to their distribution. The second half of the twentieth century became
obsessed with questions of access to knowledge. The dominant ethos was that the
more that knowledge was consumed, the better. But the bias toward consumption led
to a diminution of interest in production, or rather a confusion of the matter of the
reproduction of knowledge with its production.

The problem was a real one. For many of the sixty years prior to 2008, OECD
countries spent ever-larger percentages of their Gross Domestic Product on
funding university and industry research – whether directly or indirectly, whether
by state or private means. Yet the long-term outcome of this was incrementally
diminishing returns on the investment and less high-calibre work per capita.
One simple example will suffice to illustrate. Insulin, the drug to manage Type 1
diabetes, was serially discovered in work from 1916 through 1923. Despite billions
of dollars of research, nothing comparable in the management or the conceptual

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<tr>
<th>Decade of output</th>
<th>Works per million capita (pmc)</th>
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<tr>
<td>1900s</td>
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<td>1910s</td>
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<td>1920s</td>
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# adjusted upwards by 15% as data excludes 1999 and part of 1998
understanding of the mechanics of the condition has been forthcoming since. This type of story repeats too often across the arts and the sciences to allay the nagging concerns that there is a problem. After the 1970s, academia turned itself into a lobby to increase research funding. Its pandering to government for money became both unsettling and unseemly. Nonetheless there was in some quarters a bad conscience about this. Some insiders have come to routinely observe what Day (2011) reported: that science at the margins, where the great discoveries are made, is in a mess, that the ability to conduct blue-sky research, the kind of free-wheeling activity with the potential to make genuine scientific leaps, has been undermined by the system of bureaucratically managed peer-reviewed grants. A commonplace doubt expressed is that great scientists like Einstein and Planck who made the major discoveries of the twentieth century would not get funding under today’s government application rules. The obverse of this conundrum is that, until the 1970s, good scientists were guaranteed some money just in order to think. People were funded rather than project descriptions written to accord with vacuous bureaucratic criteria.

The national science discovery funding schemes that consolidated during the second half of the twentieth century served the function of ‘filling in the gaps’ schemes. Such procedural schemes cannot do otherwise. It is inconceivable that a researcher could apply to a bureaucratic agency to make a significant ‘discovery’—which by definition is an unknown. So what researchers in fact do is offer project descriptions that are statements of what has already been discovered along with promises to incrementally add to that corpus of knowledge what is foreseeable. Such meagre promises are then padded out with extravagant statements trumpeting the significance and innovation of the ‘discovery’ of these known unknowns. This is the antithesis of a real discovery process. Today even when blue-sky research is funded, it yields less results per unit of investment. A decade ago Diane Coyle observed what was happening to pharmaceutical companies:

Drug companies spend a fortune trying to create new products, and some tempting rewards await their success… Yet the pace of pharmaceutical innovation is disappointing. The evidence suggests a decreasing number of new products per $150 million spent on R&D. This disappointment is one of the main factors driving the pharmaceuticals companies into mergers. (2001:238)

However, as Coyle further pointed out, the strategy of merger is counterproductive from the viewpoint of serious creation: ‘Small companies are in many industries by far the most innovative even though the amount they can spend on R&D is substantially lower than the big company budgets.’ The problem is not simply size but rather the management of innovation (perhaps an oxymoron) that pushes research into conventional and safe paths that do not yield interesting results. Thus some of the heavily invested-in research fields that should generate break-throughs do not. Coyle pointed to the high-profile case of cancer research at the turn-of-the-century:
So alarmed had some leading oncologists become about the failure of past efforts in cancer research, including the vast R&D effort of the drug companies, that in December 2000 they held a “blue skying” conference in Cambridge, England. The point of the blue-sky technique is to liberate experts from prefabricated patterns and thought, from old paradigms, by bringing together a cross-section of people with completely different sorts of expertise. They will apply to the issue at stake the metaphors and ways of thinking they use in their own fields. The hope is that the exposure stimulates fresh bursts of creativity into a moribund subject. (2001: 240–241)

Lucy Marcus (2010) observes the paradox of highly exploratory research: research without specific goals frequently yields the most dramatic and far-reaching specific outcomes. It is ‘often the serendipity and lucky accident of blue skies research that brings about the most important and impactful results.’ The problem of contemporary science is the same problem of contemporary arts fields. Research yields minor increments. It fills gaps. Much is of prosaic. Quite a bit of it is junk. All procedural efforts to improve its quality, all assessment exercises, fail. They fail because bureaucracy cannot stimulate imagination. The very things that bureaucratic methodologies – and this is true of all procedural approaches to the world – are analytic in character. In contrast, the imagination and its leaps are synthetic. The two rarely, if ever, meet. The slow-down or stalling of high-level creation cannot be solved either by bureaucratic monitoring or by the bureaucratic allocation of funds.

THE UGLY UNIVERSITY AND THE AESTHETIC ECOLOGY OF THE MIND

All of this begs the question then: what drives intellectual production? The answer is certainly not ‘the Internet’. Nor is it the level of public funding, private investment or philanthropic support. Yes, intellectual production is an expensive activity. It cannot be done for free or merely for love. Yet the OECD figures indicating the inexorable rise of spending on Research and Development across 1994–2008 were not matched by equivalent outcomes. In the long run, the more money that was spent, the less was produced especially where it mattered, in high-end creation. The problem, as always, is not the level of spending (for small amounts can yield large results) but what the money is spent on. The greatest difficulty of research spending is that what counts most is counter-intuitive. In fact, it is intuition that is the most important quality in discovery but it is a quality that confounds institutional support. If you look at the typical grant application it is a promise to ‘fill in the gaps’ in knowledge in exchange for funding. If any great discovery comes of that, it is usually tangential and often contrary to the promised work. Yet only a crazy person would ask a bureaucratic grant agency to fund intuition or what amounts to the same thing, counter-intuition. Consequently, of that which is most important, we cannot speak and should shut up.
Intuition lies at the root of the process of discovery. Practically mute, intuition is the antithesis of institution. Yet without it the institutions of art and science cannot function. That is their inherent paradox. Intuition or counter-intuition is the medium of cognition that draws unlikely connections between ideas. In doing so it generates powerful and surprising explanations. Connective power lies at the core of human neurology. If bureaucratic agencies cannot fund connective power of this kind, then who or what does support it? I began this inquiry with the observation that knowledge is an objectivation. This is so because the human mind can form an immense array of possible neurological connections but, as a consequence, confronts the conundrum of form: it needs a shaping agent outside the mind to stimulate and facilitate the connections. The most powerful neurological connections are not random but rather are coherent; yet to solve problems they cannot simply repeat what exists but instead form patterns of connection that are unusual and unexpected. When neurological coherence and surprise unite, the mind advances. What unites them? At the highest and most rarefied level of human creation, what is it that stimulates and brings into being (counter-) intuitions? The simplest answer to this question is: beauty.

The University of Chicago psychologist Mihaly Csikzentmihalyi (1996: 127–147) stresses the importance of ‘inspiring environments’ to human creativity. In this, he stands in an intellectual tradition that begins with William James. Followed soon by John Dewey and George Herbert Mead, James stressed the importance of the social environment in explaining the functioning of the human mind. Accordingly, learning and making, pedagogy and creation are stimulated and shaped by the human encounter with the human ecology. Csikzentmihalyi emphasises human vistas and built environments that generate magical atmospheres – in other words: physical environments that deeply affect human thoughts and feelings. It is in beautiful settings, he contends, that minds are more likely to find new connections among ideas and new perspectives on issues. There is a reason then why Nietzsche worked in Switzerland’s Engadine Valley and Wagner wrote music in a villa in Ravello overlooking the Tyrrhenian Sea. The proposition is not that the environment creates the ideas, but rather that the encounter of the mind with the environment, the subject with the object, is what matters. Beautiful environments stimulate by providing models of suggestive order that feedback into human neurology to shape the unexpected but interesting neural pathways that lie at the root of human creation. What we have made (from the landscape vista to the beautiful villa) makes us capable of making the object world that feeds into the subject world of the creator.

The second half of the twentieth century struggled to meet its own aspirations to create. At no other time in human history has there been such volumes of rhetoric about creativity, and yet this was no renaissance period, far from it. This was also the era when the university grew so large that it came to overshadow all other institutions of creation. The number of universities proliferated, as did their size. In almost all cases, the built environment of the post-1960s university was ugly. This started with Brutalist and third-rate Modernist architectural styles of many 1960s campuses and it evolved through eclectic, slap-dash, vulgar, cheap, gimmicky, and thoughtless
architecture. Hardly any of the campus architecture of the new universities built through 1960–2010 was memorable or even good. Campus landscaping was often no better and generally worse. Many of the older, principally nineteenth-century universities suffered aesthetic decline as ugly new buildings began to blot their landscape and cheap fit-outs proliferated, notably noisy air-conditioning systems that made listening in lectures let alone high-flown contemplation a chore. For more than two thousand years it has been known that peace and quiet are essential to thinking. Late twentieth-century universities violated this fundamental premise of learning by introducing poorly sound-rated air conditioning everywhere. Universities were subject to intense public policy pressure to get as many students as possible enrolled yet without government having to pay the full and unsustainable price of this. To do this the universities cut costs by cutting corners. To ensure this they replaced traditional systems of collegial management conducted by educators with the rule of administrators who knew some things about book-keeping but nothing about education.

A high price was paid for this cheapness. OECD states congratulated themselves that ever-larger portions of youth were going to universities. But this was only fiscally feasible, and then barely at all, by having cut-price building and tawdry architecture on campuses. The invisible but further consequence of this was the slow suffocation of creation. Take away the object-context of creation and it will wither. The further irony of this is that while the object-context was starved of funds, funds flowed to research grants, and still more funds flowed to the bureaucratic monitoring of research performance as states dimly realised that per capita levels of high-level creative output were declining while the percentages of GDP spent on the enterprise of research grew. We see this comedy played out in the fate of the post-sixties universities. Australia is a good example. In the top echelon of Australian universities – the Group of Eight – the nineteenth-century sandstone universities dominated. Causation being what it is there are likely a variety of factors for this. But aesthetic environment is a crucial one, as the commonplace label ‘sandstone’ readily indicates. The worst performer in the Australian top league, Monash University, had one of the largest concentrations of humanities and social science researchers in the OECD which it housed in a Modernist multi-storey structure, the Menzies Building, built in the late 1950s that by 2000–2010 had become an industrial slum which the university then decided to part-renovate while staff occupied the building.

Beauty is a recurring characteristic of the campuses of the world’s best universities. Beauty is a function in part of resources to spend. But equally having the resources to spend is a reflection of performance, and performance being intellectual in nature is a function of an aesthetic ecology. The specifics of aesthetic ecology will vary from country to country. The Japanese aesthetic is very different from the American one. But in each case it is an important component in the causal circle of performance-resources-beauty that attracts the talent that completes the circle. Elegant economy in performance, efficient economies of resourcing, and the proportionate economy of beauty all amount to the same thing in the end. Each translates into the other, and
each is mirrored in the aesthetic ecology that houses them. A case in point is Stanford University in California. It is one of the most beautiful campuses in the world. The campus was designed by the great American landscape architect Frederick Law Olmsted and by Charles Allerton Coolidge who had been trained by Henry Hobson Richardson. Stanford University is also one of the principal, perhaps the principal, crucible(s) of America’s information and communication technology industry. It has been the seed-bed of a who’s-who of major IT companies, ranging from Hewlett-Packard, Google, Cisco Systems, Yahoo and LinkedIn to Sun Microsystems, Netscape, Rambus, Varian Associates and Silicon Graphics.

In 1950 Stanford University was a good but not great university. Frederick Terman, the university’s remarkable provost, changed that. He managed what almost no one else has done. He hoisted Stanford up a very slippery pole into the top rank of American universities dominated by a group of institutions that had come to prominence in the halcyon days of American university building between 1880 and 1910. The times conspired with Terman. The era spanning 1950–1980 was California’s golden age. Its infrastructure expanded in startling ways – amongst other reasons because America’s military heavily relocated to the West Coast. Money, funding, and contracts followed, aiding Terman’s recruiting savvy. But human beings are not just economic actors. Neither are they just status creatures. They are also aesthetic beings. The aesthetic motive – the chance to work in great surroundings – is inestimable. The promise of Olmsted and Coolidge’s vision was finally fulfilled in Terman’s time. It is unlikely, though, that most of Stanford’s contemporary elite would describe the university’s post-1950 ascent in such terms. Rather the overwhelming majority of the Stanford elect today would use the language of left-liberalism to explain the institution’s success. This language is pervasive in contemporary higher education. It is a type of reductive empty melange of the lowest common denominators of Karl Popper and American Progressivism. It is what you get if you were to extract the theory of ‘experience’ and ‘environment’ from John Dewey but leave his theory of endless experiment in place. It resolves into an anchorless vacuous paean to unfastened, unchained, and unhooked openness.

What are missing from this are two inter-related things that are central to the object-world. One is limits; the other is shape. Beauty at its core is the beauty of line and form. The human sense of world-building – and the objectivation of things – rely on the correlated human sense that the world not only is open but also that it is limited. Objects emerge first as shapes – as outlines with boundaries. We create by giving form to things and we learn to do this by observing the harmony, the order and the arrangement of objects around us. The great public architecture of a superlative campus gives those who inhabit it and who pass through it a continuous education in form, shape and pattern. This education is not hectoring or moralizing; it is simply there, almost beneath consciousness. At the same time, it incites, stimulates and encourages us to experiment with our own little constructions. It doesn’t matter whether these are built form, or engineering form, or whether they are the shapes of
words, databases, or machines. They are all architectures in their own ways. From the large public scale of the campus to the small scale of the back yard, a translation of inspiration is undertaken. Such translations end in the kind of garage experiments that made American information technology in its hey-day great. Most of these experiments (of course) fail. That is part-and-parcel of the nature of experiment. Yet some experiments do succeed. They succeed when the sense of openness – the freedom to try things – is matched by a spark, an intuition, a hint or glimmer of a method of arranging things that is an advent which is nevertheless venerable. Its newness echoes age-old ways of putting things together. It is just one more new order of the ages – one more novus ordo seclorum.

NOTES

1. As Karl Marx put it, in the *A Contribution to the Critique of Political Economy*, though he did not mean it kindly – in the social production of their life, men enter into definite relations that are indispensable and independent of their will. The delusion of Marx was well captured in his view in *The German Ideology* that communism differed from all previous political movements in that for the first time it consciously treats all natural premises as the creatures of hitherto existing men, stripping them of their natural character and subjugating them to the power of the united individuals. In the *Grundisse*, he put it more simply: the conditions of the process of social life will come under the control of the general intellect and be transformed in accordance with it. That is impossible. It implies that the object-world that human beings create could be pure meaning for us – that it could be completely transparent, de-natured, and that society could act as a collective ego (a repulsive idea) whose collective mind could overcome the split between human subject and the object world. Even assuming that the split could be overcome, it would be a disaster. The object world, including conditions that cannot be mastered, is the condition of the advancement of knowledge. By wagering on putting an end to what is independent of our volition, Marx’s communism puts us on a course for the end of knowledge, which is pretty much what practically-existing communism embodied. The general intellect turned out to be very stupid.

2. The eccentricity of the human species means that the self can experience itself as located outside of its self, as when we say to someone: ‘take a good look at yourself’, or when we refer to phenomenon of ‘ec-stasis’ – that is, the ability to stand alongside oneself.

3. Hobbes (1978 [1642/1651]): 42) says that ‘politics and ethics (that is, the sciences of just and unjust, of equity and inequity) can be demonstrated *a priori*; because we ourselves make the principles – that is, the causes of justice (namely laws and covenants)’.

4. As does the Australian sociologist of art, Eduardo de la Fuente (2010), who supposes that the powerful causality of art and aesthetic experience is a function of the art object not art discourses.

5. See for instance the figures for GERD (Gross domestic expenditure on R&D) as a percentage of GDP for the OECD as a whole as well as Japan and the United States separately in the long-term OECD statistical series Main Science and Technology Indicators. From 1994 to 2008, GERD as a percentage of GDP rose from 2.1% to 2.3% in the OECD, from 2.4% to 2.75% in the United States, and 2.6% to 3.4% in Japan. In the case of Japan this coincided with two lost decades of low economic growth.

6. This is an expression of the larger trait of bureaucratic capitalist societies to turn themselves into societies of hobbies and lobbies as the philosopher Cornelius Castoriadis put it so well. One definition of a society of hobbies and lobbies would be a society in which social media has turned into a major social obsession and in which grant-seeking behaviour, applying and lobbying for funds, has become a major preoccupation of researchers and universities. In the society of lobbies the kind of science one gets is a science of lobbies, devoted to anticipating and espousing public policy objectives and servicing the moral panics and apocalyptic seizures that periodically afflict modern societies. The sciences of global cooling and global warming are cases in point. Is it necessary to point out that these are also junk sciences?
The physicist and mathematician Alan Sokal carried out an ingenious hoax on the cultural studies journal *Social Text* in 1996. He successfully submitted a made-up article ‘Transgressing the Boundaries: Towards a Transformative Hermeneutics of Quantum Gravity’ that combined spurious science with post-modern jargon. The scientific community had a very hearty laugh at the humanities community as a result. But those who laugh last laugh loudest. The era 1998–2008 saw the rise and spread of global warming climate ‘science’. This so-called ‘science’ tried to outlaw scientific dissent and scepticism, insisting its conclusions were ‘settled’ whilst its predictions systematically failed, its data collection was suspect, and its presentation of evidence was deeply flawed. Rather than a science it was really a very successful public lobby. Many scientists casually subscribed to its rhetoric, though others saw through its claims.

Two and a half thousand years ago Aristotle observed that the necessary supplement of contemplation were the utilities of money and facilities. Without means there are no ends, though that does not mean we should confuse means and ends.

REFERENCES

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