Inclusive Governance over Agricultural Biotechnology: Risk Assessment and Public Participation

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ABSTRACT

A public outcry opposing the use of genetic modification of rice has produced a governance deadlock in China, which threatens to undermine attempts to reap the benefits that modern agricultural biotechnology can offer to the Chinese people. It is argued that this opposition to the agricultural use of modern technology is, in large part, the result, not only of lack of public participation in the decisions involved, but of an over-reliance on conventional approaches to risk assessment that do not adequately take account of the interests of all who stand to be affected by the use of the technology. Public participation is necessary, but it must be guided by equitable principles that take proper account of the rights and interests of all stakeholders. It is argued that a governance strategy based on the Principle of Generic Consistency (PGC) of the American philosopher Alan Gewirth has promise to counter the distrust of the regulators that fuels the deadlock because the PGC can be justified from the perspective of Marxist and Confucian principles that dominate the Chinese political and ethical landscape.

1. Introduction

China has a large population and is short of agricultural resource. Modern agricultural biotechnology,[1] using techniques of genetic modification, is (in principle) very promising–some would say, essential–for the Chinese Government to be able to respond adequately to the increasing challenges to food security faced by China in the context of globalization, urbanization and climate change.

However, licensing of genetically modified (GM) crops in 2009 led to an unanticipated outcry over the internet that has prevented the Chinese government from agreeing to the commercial use of GM crops.

Given the efficiency that characterizes Chinese government systems in decision making about major economic affairs in general, and Chinese enthusiasm for innovation and development, the case of GM crops in China might seem strange. In

[1] Agricultural biotechnology refers to technologies that use living organisms, biological components and biological processes in the agriculture and food industry to create useful products that are important for our wellbeing and way of life.

this paper, we attempt to understand how this deadlock has arisen, and suggest what we call 'an inclusive governance approach' to deal with the public distrust of mainstream scientists that, we argue, contributes significantly to public opposition to the commercialization of GM crops.

We begin by describing the governance deadlock. We then argue that public opposition to the use of GM crops has arisen, at least in part, because the governance strategy employed has been based on a methodology of risk assessment that purports to be value free, but at least appears to privilege the values and interests of mainstream scientists and specific economic interest groups by not taking adequate account of the interests of all who stand to be affected (negatively as well as positively) by the use of GM crops. Almost all debates on risk assessment and public decision making of agricultural biotechnology in China in the last few decades have been dominated by technological experts, and most risk communication and management has permitted only limited lay person participation. Furthermore, insofar as ethical arguments have been employed in the regulatory debate, these have tended to be confined to economic considerations from an utilitarian perspective, and rights arguments have only figured in connection with regulation of the labelling of food. But, we argue, scientific risk assessment cannot be divorced from questions about the rights, interests and wishes of human beings, and we suggest that the lack of a concern with what various interest groups view as their rights is an important factor that contributes to the current intractable situation.

To some extent, the regulators have begun to appreciate the need for lay participation in the decision-making processes involved. We argue, however, that there has been insufficient recognition of the need for a more precautionary approach, and we suggest that a promising way forward would be to build a governance strategy around Alan Gewirth's Principle of Generic Consistency (PGC)[2] (which requires agents to act in accord with the essential needs of agency of all agents). This, we argue, is not only because the PGC is capable of providing a structured way of conceiving and handling conflicts between various interests; it is a principle that can be justified on the basis of key Marxist and Confucian principles that dominate Chinese political and ethical thought.

2. The GM Governance Deadlock in China

On 22 October 2009, the Chinese Ministry of Agriculture's Biosafety Committee issued biosafety certificates to the Chinese Academy of Agricultural Sciences for a genetically modified (GM) maize designed to improve the efficiency of animal feed and reduce the pollution of animal manure, and to Huazhong Agricultural University for two kinds of GM rice varieties–Hua Hui 1 and Bt Shanyou 63–designed to

[2] See, seminally, Alan Gewirth, *Reason and Morality* (University of Chicago Press, 1978).

incorporate biological insecticides and so increase yields of rice.[3] This constituted a radical step in GM staple food development that would lead to a substantial increase in the release of GM foods into the environment and the commercialization of GM rice and maize. Shortly thereafter, Chinese GM rice breeders confidently announced that they would be commercializing GM rice and enabling hundreds of millions of Chinese people to eat GM food within a few years, though approval still needed to be given for production and commercialization in accordance with the Statute of Agricultural GM Biology, the Law of Seeds, and the Approval Procedure for Main Crops Varieties.

However, these breeders and their supporters soon found that their ambitions were opposed by unprecedented public concern expressed in social debates. As a consequence, the Chinese government has not yet approved the commercialization of any GM staple crops. Because China is a country with a large population and is short of agricultural resource, the Chinese government has a very strong motivation to apply agricultural biotechnology to deal with the increasing importance of food security in the context of globalization, urbanization and climate change. Indeed, in the words of some agricultural biologists, there is no alternative to developing GM crops.

The negative public reaction was not anticipated. As early as the late 1990s, a GM 'super cotton' was introduced and commercially cultivated without any public opposition, and even without biosecurity regulation, when the Chinese cotton industry suffered severe bollworm disease and yield loss. The 'super cotton' has proved to be a very beneficial agricultural innovation. Soon after, China began to put in place a biosecurity regulatory system for GM crops that mainly imitated the United States, with the aim of promoting agricultural biotechnology innovation. Since then, China has allowed GM cotton, tomato, sweet pepper, petunia, poplar and papaya for commercial cultivation, and licensed for feed or oil processing the raw materials of GM soybean, rapeseed, corns and cotton imports.

However, public concern and debate over GM rice has now, to some extent, shaken the Chinese government's strategic will to speedily promote the commercialization of agricultural biotechnology and is reshaping the Chinese governance landscape for GM crops. Like the position in the West, proponents of GM modification, mostly biotechnology experts, favour weak regulation based on the so called 'substantial equivalence' principle, according to which products of agricultural biotechnology, such as GM rice, or GM crops generally, are as safe as conventional agricultural products, while opponents call for regulation to be based on a precautionary principle that aims to avoid all kinds of potential risks to human welfare and freedom that arise from uncertainty about, and ignorance of, the possible effects of the developments.

[3] 年第二批农业转基因生物安全证书批准清单[List of the Second Batch of Approved Biosafety Certificates for Agricultural GMOs in 2009].
http://www.stee.agri.gov.cn/biosafety/spxx/t20091022_819217.htm. This and all internet sites referenced as accessed on 19/07/2017.

The opposition came mainly from the general public (especially from consumers in the cities), social scientists and humanities scholars, although it did include some natural scientists.

Concerns were raised about the uncertainty surrounding possible impacts on Chinese health and food safety, in which opponents exhorted citizens to refuse to be treated as 'white mice' for the novel GM rice. A few radicals even declared that the commercialization of GM rice is a 'national suicide' project,[4] and a conspiracy directed by American government and its food empire that, in the words of Jiang Gaoming, a professor at the Institute of Botany of the Chinese Academy of Sciences, 'would sacrifice the interests of the majority for the interests of a minority'.[5] Indeed, in expressing doubts about the advantages of GM rice designed to produce high yields and resistance to plant diseases and insect pests, Professor Jiang predicted that the commercialization of GM rice 'would eventually result in ecosystem turbulence'.[6]

Others joined forces with him. For example,

- Yuan Longping, at the Chinese Academy of Engineering, who is regarded as the father of hybrid rice because he bred a series of rice varieties with high yields by natural hybrid processes, suggested that the Government should be cautious about ratifying the commercialization of GM crops because scientists do not know all the potential risks that GM rice poses to human well-being and the environment, and some impacts will only be revealed in several generations to come.[7]
- Xue Dayuan, a biodiversity specialist at the China Environment Protection Ministry and a professor at Minzu University, stressed that the potential risk to human and environment is unidentifiable in the short term and expressed concerns that GM rice could transfer recombinant DNA to other plants, thus threatening biodiversity, or that they it might create a super weed or kill unintended organisms.[8]
- A physical chemist, Wang Chaohua, who has conducted soybean and research for the US Department of Agriculture, was very skeptical about the supposed benefits of the two new strains of rice, and pronounced that it is a 'scary fact' that GM seeds may be unable to adapt to abrupt climate changes and thus cause sharp drops in output, leading to a vicious cycle in which farmers plant

[4] 牧川.转基因水稻：最新国民自杀计划［EB/OL］[Mu Chuan. 'GM Rice: A "National Suicide" Project.'] http://www.wyzxsx.com/Article/Class4/ 201001/124069.html.2010-01-06

[5] 蒋高明.农业部批准转基因水稻商业化种植为什么不愿公开有关细节［EB/OL］[Jiang Gaoming. 'The Ministry of Agriculture has Approved the Commercialization of GM Rice. But Why Does It Not Want to Disclose the Details?']
http://www.sciencenet.cn/m/user_content.aspx?id=275452.2009-12-02

[6] Ibid.

[7] 王国平.袁隆平：转基因水稻商业化种植需慎重[N] [Wang Guoping and Yuan Longping, 'Commercialization of GM Rice Should be Careful.']
http://food.southcn.com/ft/content/2009-05/27/content_5195460.htm

[8] 金微. 转基因水稻安全性遭质疑[N]. [Jin Wei. 'The Safety of GM Rice is Questioned.']
http://news.sciencenet.cn/htmlnews/2010/2/228009.shtm

more GM seeds to counter crop failures, which leads to further drops in output, which leads to further planting of GM seeds, and so on. He also claimed that GM foods 'have the potential to cause serious health damage even within a very short period' and, worse still, the potential to cause 'irrecoverable damage to the soil'.[9]

- And over a hundred humanities scholars signed an online petition calling for the commercialization of GM rice to be prohibited, claiming that the issue of staple crops is a matter of concern for the national economy, peoples' livelihoods, and future generations, and that the public must have the right to informed consent on this issue.[10] They furthermore claimed that the necessary conditions for the safe commercialization of GM rice and maize in China have not be satisfied in the absence of a strict and systemic risk assessment mechanism, and a fair and transparent decision-making system and procedure involving public participation and respect for consumers' rights, and they urged that the Chinese Government set up an independent interdisciplinary committee to investigate and assess the policy and social impacts of commercializing of GM crops.[11]

On the other hand, advocates, most of them experts in biotechnology, who have a dominant say in the formulation of policy, insisted that the technology is precisely controlled and safe, and criticized the opponents for their 'ignorance' and a 'phobia' against anything obtained through genetic modification.[12] In this, some of the public antagonism in China mirrors opposition to gene technology in the West.

However, increasingly, Chinese citizens engage in public discussion concerning vital interests through communication on social media,[13] such as Weibo (microblogging), and the anti-GM initiatives that began early in 2010 have been conducted mainly in the public media, especially the internet.[14] The confrontation there has hardly been polite, and cannot be construed as a debate. It is characterized by depiction of those on the other side as acting out of personal or sectional interest, dishonesty, ignorance, or a combination of these. Rather than seeking to find some common ground on

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[9] Wang Chaohua: 'Dangers are There for All to See'.
http://www.chinadaily.com.cn/opinion/2010-03/15/content_9588924.htm

[10] 曹南燕等.关于暂缓推广转基因主粮的呼吁书[N]. [Cao Nanyan, et al, 'Appeal for the Suspension of GM Staple Crops.'] 2010-03-12 http://www.sciencenet.cn/m/user_content.aspx?id=301776

[11]海外学者：我们关于转基因水稻、玉米商业化的意见[N]. [Overseas Scholars, 'Our Opinions on the Commercialization of GM Rice and Corns.']
http://www.wyzxsx.com/Article/Class16/201003/139268.html

[12] 李建军.2012.关于转基因水稻商业化的辩论——相关的伦理和公共治理问题，科学学研究 [N]. [Li Jianjun, 'The Chinese Debate on Commercializing GM Rice: Ethical Issues and Related Public Governance Issues.'] (2012) 30(8）*Studies in Science of Science*, 1121–1127.

[13] A. Ely et al, 'Sustainable Maize Production and Consumption in China: Practices and Politics in Transition' (2016) 134 *Journal of Cleaner Production* 259–268.
Before 2010, most people in rural China did not have easy access to the internet. But now almost all young people can use it easily in rural China, and they use it for social activities and E-business (which links the farm to supermarkets and consumers in cities directly).

[14] Huang Ji-kun and Peng Bo-wen, 'Consumers' Perceptions on GM Food Safety in Urban China' (2015) 14(11) *Journal of Integrative Agriculture* 2391–2400

which rational discussion can proceed, those on the other side instead regularly have their motives questioned and are subjected to personal invective, not unlike the current 'debates' in social media in the West between some supporters of President Trump and Hillary Clinton in the United States, or between some hard-line supporters of Brexit and its opponents in the United Kingdom. So, we surmise, but can only surmise, that the difficulties that exist with imposing quality control over content on the internet exacerbate the problem of achieving a rational debate in proportion to the extent to which communicative interaction is internet based.[15]

In any event, unwilling to ignore the antagonistic public reaction, the Chinese government has not yet approved the commercialization of any GM staple crops; and, though GM animals, such as fish, have been available in China since the late 1980s, they cannot yet be commercialized.[16] The result is that the existing policy amounts to one of 'permitting to eat but not allowing to plant'. On the one hand, China imports a huge volume of GM soybeans and maize in order to satisfy increasing industrial and livestock raising needs. On the other hand, the commercialization of GM maize and rice promoted by Chinese corporations faces such strong opposition that it has been suspended.

In order to deal with this impasse, the Chinese Government has set up a dedicated agency to collect and analyze online public opinion in order to understand public opinions and responses to all kinds of public decision and policy, and this is where the matter now stands.

3. Risk Assessment of Agricultural Biotechnology and Related Uncertainties

Like all technological innovations, agricultural biotechnology is a future-oriented endeavor; so its governance necessarily requires balancing the desire to harness potential future benefits with sensitivity to existing uncertainties and a constructive engagement with diverse societal needs and concerns.[17] While agricultural biotechnology is used to produce food, a basic human need, it also has the potential to affect the environment in a way that impacts negatively on basic human needs, and it is clear that, to some extent at least, the governance crisis has been caused by public concern and fears over the risk and safety of the processes and products involved.

[15] For an insightful general discussion of the pros and cons of access to the internet in China (interestingly from a Gewirthian perspective) see Xiaowei Wang, 'A Human Right to Internet Access: A Gewirthian Approach' (2016) 11(4) *Front. Philos. China* 652–670.

[16] While the Chinese Government is in favour of the commercialization of GM crops, and while the Government has considerable powers to regulate and guide public opinion, it does not consider it wise or necessary to ignore the opposition. The Government's view is that it is a prerequisite for good governance to permit citizens to express their dissent within a 'moderate range', as a means to enhance the trust of the public in order to facilitate support for government policies and projects, unless the opposition disproportionately threatens the public interest in national security and a stable society.

[17] S. Hartley, F. Gillund, L. van Hove, and F. Wickson, 'Essential Features of Responsible Governance of Agricultural Biotechnology' (2016) 14(5) *PLoS Biol* e1002453. doi:10.1371/journal.pbio.1002453.

Less obviously, perhaps, agricultural biotechnology might be applied in ways that are harmful to moral interests.[18] For example, agricultural biotechnology can raise social justice issues and infringe human rights by interfering with the right to choose what one wants to eat. When it involves animal biotechnology and synthetic biology to create functional chimera and hybrids between humans and animals, it also raises concerns focussed on human dignity. More speculatively, as some opponents have claimed, the widespread use of agricultural biotechnology might bring about large-scale disasters or pose 'existential risks' that would permanently curtail humanity's ability to flourish.[19] While this might seem unlikely, unimaginable and distant, the accumulation of small probabilities can result in big disasters and endanger local or global public goods that constitute the fundamental conditions individuals need for a good life lived autonomously. In general, it cannot be altogether discounted that the development of agricultural biotechnology could engage significant human moral and political interests, implying that we should prudently and seriously regulate this kind of technology and its commercialization.

But how are the relevant risks to be assessed? Risk assessment has been the foundation of existing governance frameworks for agricultural biotechnology, in particular, for GM foods. The so-called 'principle of substantial equivalence' proposed and used for GM food governance in the United States, which is based on an initial scientific assessment of the safety risk of GM crops, is founded on the idea that, unless otherwise shown, products of agricultural biotechnology, such as GM rice or GM crops, are as safe as conventional agricultural products. On the other hand, 'the precautionary principle' used in European agricultural and environmental biotechnology governance is based on the idea that, because of unknown risks and uncertainty, it should be presumed that the products of agricultural biotechnology are unsafe unless otherwise shown. As an increasingly strong economic power with the largest population in the world, China is caught in an unprecedented technological decision making and governance dilemma that requires it to choose between these two approaches.

The term 'risk', properly speaking, refers to a situation in which it is possible confidently to quantify both the magnitudes of harm and the probabilities of harm eventuating of a defined range of outcomes; that is, risk is a product of the probability and the severity of the defined hazards that an action might produce. This conception has been incorporated in concrete regulations, such as the 'procedural manual' of the Codex Alimentary Commission 2014 (CAC), where risk is designated as a function of the probability of an adverse health effect and the severity of that effect, consequential to a hazard(s) in food, and risk assessment is depicted as a scientifically based process consisting of the following steps: (i) hazard identification, (ii) hazard characterization,

[18] Deryck Beyleveld and Roger Brownsword, Roger, 'Emerging Technologies, Extreme Uncertainty, and the Principle of Rational Precautionary Reasoning' (2012) 4(1) *Law, Innovation and Technology* 35–65.

[19] Future of Humanity Institute, University of Oxford and Minister for Foreign Affairs of Finland 2017. *Existential Risk: Diplomacy and Governance, Global Priorities Project*
https://www.fhi.ox.ac.uk/wp-content/uploads/Existential-Risks-2017-01-23.pdf

(iii) exposure assessment, and (iv) risk characterization.[20]

This conventional approach to risk assessment has generally been applied to the characterization of risks from a chemical additive or pesticide with well-characterized and known toxicity and substantial long-term data on standard consumption levels. But in many examples of agricultural biotechnology, these approaches encounter all kinds of uncertainty, which renders such quantification incomplete or problematic, because neither the regulators nor the scientists can provide enough and explicit scientific evidence about whether or not various hazards might or might not exist, let alone with what probability they exist. As against the situations with which they have been familiar, they are confronted with situations in which the uncertainty they face is one in which probabilities cannot be attributed to future states, which are often indeterminate themselves. To complicate matters, for various reasons, this uncertainty is not simply the absence of knowledge,[21] and this means that knowledge diffusion or science popularization is not enough to mitigate public suspicion about risk assessment. Given the possible long term and large scale impact of agricultural biotechnology to our food chain and environment, due to limits of predictability, knowledge-ability, or the use of novel procedures, risk assessment and risk governance have to face all kinds of fear and disagreement about so-called 'unknown unknowns'.[22] In this context, decision making must take into account that there are multiple subjects, bringing different values, knowledge and interests to bear on the situation that can, in the main, be avoided in conventional scenarios.

We suggest that the 'extreme uncertainty' surrounding the effects of agricultural biotechnology should be characterized as a cognitive condition in which regulators believe that is possible (or, not impossible) that X might 'bring about' (cause, result in, or lead to) Z, which is to say that regulators are neither certain that X brings about Z nor certain that X does not bring about Z, that is, they (regulators and their expert advisors) can say only that the probability of X causing Z is ›0‹1. Assuming that regulators have a negative conative attitude towards Z (that is, they fear that X might cause Z), it surely would be irresponsible for them simply to gamble on their fears being misplaced. However, it is far from self-evident that regulators would act rationally and responsibly if they took precautionary measures to protect against Z when (1) it is not certain that X will lead to Z, indeed, when the likelihood of X leading to Z could be anywhere in the range ›0‹1; and (2) the conative attitude towards X is positive (so that restricting or giving up X has a negative value). Generally, in some such conditions, limited scientific facts cannot be expected to play a decisive role in a convincing decision making basis.[23]

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[20] Codex Alimentarius Commission, *Procedural Manual*. Twenty-second ed. 2014. ftp://ftp.fao.org/codex/Publications/ProcManuals/Manual_22e.pdf

[21] Paul Sollie, 'On Uncertainty in Ethics and Technology' in Paul Sollie and Marcus Düwell (eds), *Evaluating New Technologies: Methodological Problems for the Ethical Assessment of Technology Development* The International Library of Ethics, Law and Technology 3, DOI 10.1007/978-90-481-2229-5 10, (Springer Science and Business Media B.V., 2009) 141-158

[22] Ibid. 151.

[23] Beyleveld and Brownsword (n 12).

A basic problem is that, risk assessment, as the foundation of existing governance frameworks for agricultural biotechnology, is regularly claimed to be 'science-based' and free of values. So, when the decision making and governance of agricultural biotechnology is confined to a technical assessment of risks to human and environmental health, it limits who can legitimately participate in decision-making processes, and privileges technical experts. The inclusion of nontechnical experts is currently confined to the end of the risk assessment process, when public stakeholders are invited to comment on expert-defined assessments of environmental and human health risk without much potential to influence the assessment itself.[24] However, because of the kinds of uncertainty that surround the effects of agricultural biotechnology, 'a rational risk assessment' must take into account ethical and social concerns. The governance process must, indeed, include the three conventionally recognized elements of risk analysis-risk assessment, risk management and risk communication. But it must also extend beyond them. Indeed, public perceptions of risk and related uncertainties should be a focus for agricultural biotechnology governance. A governance that takes into account all relevant risks and uncertainties needs to be based not only on valid and reliable scientific research but also needs to consider public experience and perception of these risks and uncertainties, for it is only on the basis of knowing and understanding this perception that the reasons for resisting scientific assessments can be responded to rationally. In short, to deal rationally with the uncertainty surrounding risk assessment and have responsible governance, it is necessary for regulators to consider public concerns and mobilize public participation. This because the governance aim is not only to protect consumers from risk and uncertainty but also to produce a just distribution of benefits and interests that might result from the application of new technology. As Hermansson and Hanson[25] have persuasively claimed, there is a big difference between (i) A having the benefit and also taking the risk, and (ii) A having the benefit but B taking the risk.[26]

4. Public Participation and Conflicts of Values and Rights

On this basis, we approve the fact that public participation in agricultural biotechnology governance has recently gained mainstream support in China. At first glance, the general public is concerned about the impact of novel GM rice on their own health because of rumors to the effect that GM rice or corn contains certain toxins that might cause cancer or infertility and so on. If this were true, it would

[24] Hartley S, Gillund F, van Hove L, Wickson F. 2016. 'Essential Features of Responsible Governance of Agricultural Biotechnology'. *PLoS Biol* 14(5): e1002453. doi:10.1371/journal.pbio.1002453

[25] Hélène Hermansson and Sven Ove Hansson, 'A Three-Party Model Tool for Ethical Risk Analysis', (2007) 9 *Risk Management* 129–144.

[26] See also Jo Wolff, 'Five Types of Risky Situation' (2010) 2 *Law, Innovation and Technology* 151, and Maria Lee, 'Beyond Safety? The Broadening Scope of Risk Regulation' (2010) *Current Legal Problems* 241.

certainly be an unacceptable 'existential risk' for most Chinese, who use rice as a staple. Therefore, unless they are persuaded that this risk is not real, many people will, perfectly reasonably, be resistant to the commercialization of GM rice. After all, most of the end products of agricultural biotechnology, such as GM rice, are going to be introduced into the supermarket and dining table, and so incorporated into the human food chain.

But public concern over agricultural biotechnology is not only limited to the possible health risks, but also includes fears about possible environmental disasters and social issues, such as the impact of the extension and prevalence of agricultural biotechnology for small farmers without investment capacity. And it is also very important that risk assessment addressees a series of right claims, such as the right of citizens to information they need for public decision making, the right of consumers to choose autonomously what they eat, as well as the right of farmers to choose freely what they plant, and so on. We suggest that, given the uncertainties that genuinely exist, (often unacknowledged) conflict over values and rights is an important reason why the debate about GM rice has been irrational and polarized, thus making the governance intractable.

But this has not been adequately recognized by many proponents of agricultural biotechnology, especially some biotechnological experts and regulators. They persist in considering the decision making stalemate to be largely a product of scientific irrationality or ignorance on the part of the public, the legitimacy crisis to be due to knowledge deficiencies of the public. Consequently, they take it for granted that scientific knowledge diffusion and education will mitigate the governance conflicts. However, because this is not always the case, the more scientists preach science to the public, the fiercer resistance from the public becomes, and the resistance is transformed into a crisis of public distrust of decision makers and regulators. It seems to us, therefore, that China has been making the same mistake as has characterized public engagement in the West (especially in the UK). As Sheila Jasonoff argues, while public engagement has been recognised to be a good idea in the West, it has been executed very poorly.[27]

In a sense, rational precautionary reasoning is necessary to mitigate the governance stalemate. But in order to make precautionary reasoning rational, we need to devise a responsible, just and inclusive governance strategy which pays more attention to the risk perception and mindset of the public which is driven by moral values and social concerns. If and when adopted regulations do not comply with the public's perception of risks, policy makers will find themselves under pressure to ban or restrict the use of the respective products. So, making a wise choice on a case-by-case requires public debate involving many voices.[28]

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[27] See Sheila Jasanoff, *Designs on Nature: Science and Democracy in Europe and the United States* (Princeton University Press, 2007), and there are similar echoes in Paul Street, 'Constructing Risks: GMOs, Biosafety and Environmental Decision-Making' in Hans Somsen (ed), *The Regulatory Challenge of Biotechnology: Human Genetics, Food and Patents* (Elgar, 2007) 95.

[28] Venki Ramakrishnan, 'Potential and Risks of Recent Developments in Biotechnology.' (2017) *AAAS*

But this involvement is not enough. This is because there has developed a fundamental distrust of technocrats and regulators. This distrust is partly due to institutional deficiencies, such as lack of risk communication mechanisms about emerging technologies, or less transparency about regulatory criteria and procedures. But the main problem lies in the arrogance of technocrats and some regulators who often intentionally or unintentionally disregard the reasonable claims of basic rights from citizens, for example, the right to information needed for decision making. Furthermore, a few scientists' misconduct, recurrent severe food safety scandals (over, e.g., poisoned milk powder, and accidental exposure of all kinds of illegal planting of GM rice) exacerbates the suspicions of the public about scientific evidence and a regulatory system based on risk assessment. This has, not unreasonably, created an environment in which a variety of rumors and provocative emotions from network platforms and social media exacerbates distrust and irrational responses to different opinions and values.

To sum up. Given past experience and current public attitudes towards agricultural biotechnology, public participation could be the most effective way to break the existing governance deadlock. But who has the right to express their concerns? Who should regulators be morally and politically responsible to? These are crucial questions, for including various groups will not be enough to produce decisions that will be generally acceptable unless we are able to justify the governance and decision making framework to those who have very different views about rights and who should be subjects of our moral concerns. To do this requires both a new regulatory system and a generally acceptable moral theory.

5. The Principle of Generic Consistency (PGC) and the Possibility of Inclusive Governance

The fundamental questions for a strategy of inclusive governance concern, first, how to build/rebuild trust for the authority of decision making, and, second, how morally and politically to justify the authority of governance. Public engagement and deliberate democracy or discourse ethics may be feasible tactics but this can only succeed when conducted in a context in which there is agreement about the general principle and criteria for us to cope with all kinds of conflicts of values and rights claims. We will not attempt to answer the first question as such, though it is not implausible to think that institutionalization of an acceptable answer to the second implies an answer to the first question. So, our focus will be on what kind of moral theory can perform this function?

In the context of current China, the dominant ideologies are Marxism and Confucianism. As a significant political theory, Marxism provides the justification politically and morally for the leadership of the Communist Party in China, which emphasizes that social governance should be for the people and by the people, but it is

Annual Meeting, Saturday 18 February. https://royalsociety.org/~/media/news/ 2017/ venki-ramakrishnan-aaas-speech-gene-tech-18-02-17.pdf?la=en-GB

debatable whether it can play an important and proper role in agricultural biotechnology governance over matters regarding extreme uncertainty about the future. Compared with Marxism, Confucianism has more than 2000 years of historical and cultural accumulation and still has a pivotal place in Chinese society. However, its general principle, the Golden Rule: 'Do unto others as you would have them do unto you' has rarely been appealed to as a standard to govern public decision making about governance in a risky society. So, even if we believe conformity with Marxism and Confucianism is necessary for any moral theory that can do the job we wish to assign to it, we still need to show how these links can be effected.

According to Gewirth,[29] the PGC is not only the supreme principle of morality, but the supreme principle of all practical reason. By saying that it is the supreme principle of morality, he means that it is the principle that anyone who accepts that morality exists (i.e., anyone who believes that there is a system of practical precepts governed by an absolutely unconditional impartial imperative, a categorical imperative that requires agents to treat all agents with equal concern and respect when considering the permissibility of their own actions) must accept as the standard for their conduct simply by understanding the idea of morality. By saying that it is the supreme principle of practical reason, he means that it is the principle that anyone who reasons practically (i.e., does something for reasons) must accept as the criterion for assessing rational action.

He thus claims that the PGC is trans-historical, not in the sense that it has been accepted in all cultures and times, but that it is a principle with which all practical precepts of all cultures and times unconditionally ought to be consistent. This is not to say that cultural variability is not permissible, merely that cultural sovereignty may apply to the choice of norms only if these are consistent with the PGC.

He attempts to justify this claim by arguing that the PGC is 'dialectically necessary' for agents. By this he means that any agent who fails to accept the PGC misunderstands what it is to be an agent (i.e., misunderstands what it is to be capable of being guided by any practical precepts at all), and thereby implicitly denies being an agent, thus denying being capable of accepting/acting in accord with any practical precepts at all. The notion of being an agent he employs is very thin. Agents are defined as beings able to act for reasons, and an action is defined as the voluntary use of means in order to achieve one's chosen purpose (a purpose that one voluntarily consents to). As such, there is nothing culturally specific, or historically contingent, about the concept of agency employed.

Gewirth's argument for the PGC may be presented as having the following form.[30] It is argued, first (Stage One), that the Principle of Hypothetical Imperatives (PHI), which states

[29] Alan Gewirth (n 2).

[30] See, e.g., Deryck Beyleveld, 'What Is Gewirth and What Is Beyleveld: A Retrospect with Comments on the Contributions' in Patrick Capps and Shaun D Pattinson (eds), *Ethical Rationalism and the Law.* (Hart Publishing, 2017) 233–255.

> If an agent wishes to achieve the agent's chosen purpose E (or act under the agent's chosen purpose P), and doing X or having Y is necessary to do so, then the agent ought to do X or pursue having Y, *or give up E (or P)*

is dialectically necessary for an agent (any agent); i.e., not to accept the PHI is for an agent to imply that he or she is not able to pursue any purpose or act under any practical precept.

Now, if there are conditions that are necessary for an agent to achieve the agent's purposes (in the sense that not to have the conditions in place will have a negative effect on the agent's ability to achieve the agent's purposes), *whatever they are* (which conditions Gewirth designates as necessary goods, but which may also be called generic conditions of agency [GCAs], which are categorically instrumental needs for agency, i.e., instrumental conditions regardless of E or P), and there clearly are, such as, life, and the necessary means to this, accurate information about the means to one's purposes, and sufficient mental equilibrium of make attempts to pursue (translate a desire for E into action for E), then it is dialectically necessary for an agent (any agent) to consider that the agent ought to defend the agent's GCAs *unless the agent is willing to suffer generic damage to the agent's ability to act.*

Gewirth then argues (Stage Two) that it follows that it is dialectically necessary for an agent (any agent) to consider that the agent has positive as well as negative rights to the GCAs under the will conception thereof, meaning that other agents ought not to interfere with the agent's possession of the GCAS against the agent's will and ought (if able to do so) to aid to agent to achieve secure this possession of the agent is unable to secure this possession by the agent's own unaided efforts, and wishes assistance.

Finally (Stage Three), he argues that, because it is dialectically necessary for an agent to hold this, it follows that it is dialectically necessary for the agent to accept that all agents equally have these rights to the GCAs, and consequently because the agent referred to is any agent, it is dialectically necessary for all agents to accept this.

Stages Two and Three have not been universally accepted by philosophers who have considered Gewirth's argument.[31] While we consider that they are mistaken in their criticisms, mainly because they fail to portray the argument correctly,[32] we do not need to rely on this argument for the purposes of this paper.

This is because Gewirth is surely correct when he maintains that it is dialectically necessary for agents to accept the PHI and that there are GCAs. It follows from this that anyone who holds that agents ought to treat all agents with equal concern and

[31] See, e.g., the essays in Edward Regis (ed), *Gewirth's Ethical Rationalism: Critical Essays with a Reply by Alan Gewirth.* (University of Chicago Press, 1984).

[32] See, especially Deryck Beyleveld, The Dialectical Necessity of Morality: An Analysis and Defense of Alan Gewirth's Argument to the Principle of Generic Consistency. (University of Chicago Press, 1991). See also, e.g., Deryck Beyleveld, 'Williams' False Dilemma: How to Give Categorically Binding Impartial Reasons to Real Agents' (2013) 10 Journal of Moral Philosophy 204–226; and Beyleveld (n 10).

respect for their agency (for their humanity, as Kant[33] would say), must accept the PGC. Whether or not acceptance of this premise can be shown to be dialectically necessary for agents, or something that all agents necessarily ought to accept for some other reason, such a premise operates as a key principle within, e.g., the United Nations Declaration of Human Rights (UDHR) 1948,[34] within Kantianism, utilitarianism,[35] discourse ethics,[36] and Confucianism,[37] It is also implicit in the Marxist slogan 'From each according to his ability, to each according to his needs'.[38] Thus, we contend that, regardless of whether or not the PGC is accepted by those who hold these theories, they necessarily ought to accept the PGC or else give up the impartiality premises they purport to accept. In other words, our claim is that the PGC is as acceptable (in principle) in China (through Confucianism and Marxism) as it is the West (through, e.g., Kantianism, utilitarianism, and discourse ethics) and anywhere on the basis of acceptance of the UDHR 1948. Indeed, if human needs are understood as the GCAs, then the Marxist dictum is well-nigh identical to what the PGC states.[39]

How the PGC is to be applied to generate a picture of an ideal community of rights as the first principle of dispute resolution has been discussed elsewhere,[40] as has the fact that the PGC, while primarily and directly protective of agents, and not of human beings (let alone other creatures that lack the capacities for agency), nevertheless imposes precautionary duties on agents to respect the interests of such beings (which is important in assessing what required for a sustainable set of living conditions that is morally acceptable).[41] Since the PGC is a genuinely egalitarian principle, supporting an authentic community of rights (which, because the PGC views GCAs as things agents have rights to possess, not merely as things that they have rights not to be interfered with, is very different from the libertarian rights picture supported by American philosophers such as Robert Nozick),[42] it authorizes, indeed, requires, the empowerment of all agents and communities to deny the authority of a system of

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[33] See Immanuel Kant, *The Metaphysics of Morals* (translated and edited by Mary Gregor) (Cambridge University Press, 1996) (first published 1797) 209.

[34] Article 1 of which states:' All human beings are born free and equal in dignity and rights.'

[35] See Allan Gibbard, 'Utilitarianism and Human Rights' (1984) 1(2) *Social Philosophy & Policy* 92–102.

[36] See Deryck Beyleveld and Roger Brownsword. 'Principle, Proceduralism, and Precaution in a Community of Rights'. (2006) 19(2) *Ratio Juris* 141–128

[37] This through its adherence to the Golden Rule: 'Do unto others as you would have them do unto you'. For more detailed discussion of the compatibility of Gewirthian theory with Confucianism see, e.g., Shu-Mei Tang and Shang-Yung Yen, 'Confucianism and Gewirthian Human Rights in a Taiwanese Context', in Per Bauhn (ed) Gewirthian Perspectives on Human Rights (Routledge, 2016) 111–124.

[38] Karl Marx, Karl. *Critique of the Gotha Programme.* https://www.marxists.org/archive/marx/works/1875/gotha/ch01.htm

[39] See Deryck Beyleveld, 'The Principle of Generic Consistency as the Supreme Principle of Human Rights' (2011) (13) *Human Rights Review* 1–18.

[40] See Deryck Beyleveld and Roger Brownsword, *Consent in the Law* (Hart Publishing, 2007), Chapter 10.

[41] See Deryck Beyleveld and Roger Brownsword, Roger, *Human Dignity in Bioethics and Biolaw* (Oxford University Press, 2001), 119–133.

[42] Robert Nozick, *Anarchy, State and Utopia* (Basil Blackwell, 1974). See also Alan Gewirth, *The Community of Rights* (University of Chicago Press, 1996).

governance that effectively insulates the 'expertise' of technocrats from public scrutiny and genuine debate.

Application of the PGC essentially involves assessment of the optimal balance of the generic interests (the GCAs) of all agents, to which the PGC grants inalienable rights. How these generic interests are affected by actions is however, not determinable a priori, and it is at this point that the question of risk assessment arises, the chief function of the PGC being to provide substantive criteria, a baseline, for acceptable moral and political decision making, whether for individual action or collective strategy making. In all cases the premier consideration is the impact on the generic interests of the individual and the collective and the symbiotic community. This must be done in community. There is no assumption that all will agree about outcomes here. What the PGC requires when disputes about 'the right answer' persist is that the authoritative answer be the outcome of a procedure that is consistent with the requirements of the PGC (which permits of a range of institutional designs, all of which, must however, include requirements that they be conducted in good faith, transparently, and accountably, geared towards protecting the generic interests of agents).

As for risk assessment itself, if there is conventional risk about what affects generic interests, it is reasonable to manage risk through risk assessment based on scientific evidence and facts while, of course, requiring regulators to consider the risk experience of the public and conduct risk communication with the public. If a generic interest is engaged that has ascertainable risk, it is reasonable to prevent risk through necessary measures, to try to alleviate public concern by education on scientific principles, and to try to promote the application of agricultural biotechnology. However, If there is extreme uncertainty，then precautionary reasoning may be applied to suspend approval of the relevant technology and/or business application of it, *but only if* the public deems the importance of avoiding the uncertain risks of a negative effect on their generic interests to be more important than the real or uncertain positive effects of the technology on their generic interests.[43] Without this caveat, the mere possibility of adverse effects on generic interests will prevent any applications that might and will have beneficial effects on generic interests, and to do allow this is irrational.

6. Conclusion: Towards Inclusive Governance

In general, the development of agricultural biotechnology involves significant moral and political interests for humanity, which means that we should prudently and seriously regulate this kind of technology and its commercialization. We have focused on the special context of governance of agricultural biotechnology in China, and have argued that regulators to apply an inclusive governance strategy which incorporates precautionary reasoning and public participation together.

[43] Beyleveld and Brownsword (n 12).

Inclusive governance regulated by the PGC is a methodological framework which sets out some procedures that substantive risk management, regulation or decision making in specific contexts must follow if they are to reasonable and acceptable. Such governance, while it cannot guarantee public trust, has, we have argued, the potential to reduce distrust of the public by eliminating the domination of risk assessment by technocrats by providing values (the GCAs) that all can and rationally must accept.[44]

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[44] In general terms our analysis supports the idea of a 'public ethics' as recommended by Nuffield Council on Bioethics' December 2012, report on *Emerging Biotechnologies*, with the difference that we propose that a public ethics be centred around the PGC as its governing principle.