'Who's Next?' Nuclear Ambivalence and the Contradictions of Non-Proliferation Policy

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This paper argues that the limit of conventional non-proliferation policy analysis is marked by the inability to come to terms with the ambivalence of nuclear power. Ambivalence is often glossed over in the literature as "dual use" technology; the "dual use" formulation misleadingly transfers attention to the operator or manager of technology rather than see it as a structural feature of the technology itself. By contrast, this paper argues that ambivalence is not a choice under the control of good or bad leaders. Regardless of "good" or "bad" technological choices made at different points of time, the ambivalence of nuclear technology does not go away. Two cases are explored to assess the impact of nuclear ambivalence on non-proliferation policy: the declarations by North Korea and India that they are nuclear weapons states. In both cases, this paper shows, international policymakers assumed long before the actual decisions were taken that these countries intended to build nuclear arsenals. The international community took "appropriate" action, namely, a coordinated policy of sanctions and technology denial, based on this unverifiable conclusion. This approach had the unintended consequence of reducing the costs of each country's eventual decision to "go" nuclear.

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First we got the bomb, and that was good,
'Cause we love peace and motherhood.
Then Russia got the bomb, but that's okay,
'Cause the balance of power's maintained that way.
Who's next?
[...]
Luxembourg is next to go,
And (who knows?) maybe Monaco.
We'll try to stay serene and calm
When Alabama gets the bomb.
Who's next?
Who's next?
Who's next?
Who's next?

<div align="right">Tom Lehrer "Who's Next?" (1965)</div>

Why 'Who's Next?' Tells Us Less Than We Need to Know

Satirist Tom Lehrer's lyrics may be dated but sum up perfectly a familiar and ongoing narrative of the dangers of nuclear proliferation. With time, more and more countries will acquire nuclear weapons, leaving the world far more unstable than it is now: would you be "calm and serene" if Alabama had the bomb? Probably not. A second glance at the lyrics, however, makes us realise that they also offer an ironic counterpoint to a generalised fear of others: is loving "peace and motherhood" adequate justification for the US to continue to have thousands of nuclear weapons? Are Russian nukes really "OK" because they allegedly maintain the "balance of power"? Who really offers a greater danger to world peace and global order, those new nuclear countries with their tiny arsenals or the immense collective arsenals of the established and legally sanctioned nuclear weapons states (NWS)? These concerns, glossed respectively as "horizontal" and "vertical" proliferation in the literature, remain the starting point for the study of nuclear weapons policy and theory today.

It is striking that so little has changed about the way we think about nuclear weapons in the 45 years since Lehrer's lyrics were first penned. The most fundamental question relating to the presence of nuclear weapons is still unresolved: is the goal of international peace and stability better served by nuclear non-proliferation, or, by arms control and eventually general nuclear disarmament? Regardless of what the correct answer is, there is no question that the bulk of scholarly effort over the last 45 years has been dedicated to trying to understand the dynamics of nuclear non-proliferation ("Who's Next?"), rather than arms control, nuclear renunciation, or general disarmament. The majority of scholars of nuclear politics have, through their scholarship,

shown that they assume a greater danger to global order from new nuclear weapons-possessing countries, rather than from the arsenals of the acknowledged nuclear powers, even if this assumption is rarely explicitly acknowledged. This leads to the assertion that scholarly effort in this field has been difficult to separate from (and has often been driven by) the national security concerns and policy preferences of NWS.

This article uses Tom Lehrer's lyrics as a convenient point of departure to go beyond the familiar starting point of privileging the study of nuclear weapons *acquisition* over all other aspects of nuclear power. Through a focus on the technology of nuclear power, the following analysis identifies a major intellectual and policy cul-de-sac that conventional approaches to nuclear proliferation have led to. The paper argues that due to nonproliferation studies' inability to come to terms with the inherent *ambivalence* of nuclear power, the regime that seeks to govern the rise of new nuclear weapons powers is now a factor promoting nuclear proliferation. In other words, this paper concludes that nuclear proliferation policy promotes nuclear proliferation: a "contradiction" of no small import.

Acquisition and Renunciation

Although there have been a number of proposals made to understand the desire to acquire nuclear weapons, the most general formulation has been offered by Scott Sagan (1996-97). Sagan reviews the evidence to argue that countries build nuclear weapons (a) because they are insecure; (b) due to bureaucratic pressures or "domestic politics"; and (c) for reasons of prestige and recognition, the "norms" model. What this gives us are three factors that explain why countries build weapons. If we reverse the sign on each of these factors, they will, at best, only tell us why countries that want to build weapons are unable to do so. Even more important than this summary of the evidence of why countries build weapons is Sagan's conclusion that no one of these factors can trump the others and stand as the overriding reason for nuclear proliferation. He shows that no single factor adequately explains any country's nuclear history, and, more than one of these reasons holds for all countries that have acquired nuclear weapons. Applying the principle of parsimony is empirically unsustainable. "Nuclear weapons proliferation and nuclear restraint have occurred in the past, and can occur in the future, for more than one reason: *different historical cases are best explained by different causal models* (Sagan 1996-97, 85, italics added). For all that is very useful in Sagan's formulation, it leaves us short of a comprehensive explanation of nuclear power. Most important, it does not help us understand why countries *renounce* nuclear weapons altogether.

Renunciation is only one of the terms that commonly used to describe why countries give up nuclear weapons programmes. Analysts distinguish between countries that have renounced nuclear weapons before developing them ("renunciation", e g, Australia, Canada, Japan, New Zealand, Norway, Sweden, Switzerland), after acquiring them ("reversal", e g, South Africa, Belarus, Kazakhstan, Ukraine), and during the process of developing them ("rollback", e g, Taiwan, South Korea, Libya, Brazil, Argentina). In the last 50 years, all three forms of renunciation

have taken place, making it clear that the possession of nuclear weapons is hardly irreversible.

It was once the case that explanations of nuclear renunciation were primarily insecurity-based. Paul (2000) and Reiss (1995) proposed that countries give up nuclear weapons because they have come to be less insecure than they were when they decided to develop weapons. The argument was that their external environments had changed and/or other countries had offered them security guarantees. Domestic factors were sometimes acknowledged to also play a role, as in the coincidence of renunciation and the return to civilian rule in Brazil and Argentina, or, the dismantling of apartheid in South Africa. However, domestic factors were subordinated in this literature to insecurity-based reasons.

In recent years, the tendency to fall back on security-based explanations has declined. Studies by Solingen (2007) and Rublee (2009) use domestic politics and social psychological explanations to explain why countries "choose nuclear restraint". Indeed, the literature on renunciation has increased substantially in recent years, corresponding to an increased awareness of the importance of international norms and the rise of constructivist approaches to international relations. Just as Sagan argues that different factors explain different cases of weapons acquisition, we find that different factors explain different cases of nuclear renunciation. We now think that coercive diplomacy, the combination of a desire for international recognition and material benefits, and, the particular historical circumstances of the end of the cold war played no small role in recent cases of reversal and rollback.[1]

A very different set of explanatory factors must be highlighted to understand those countries that decided to abjure the acquisition of nuclear weapons altogether, although the means to develop them were available and there were powerful domestic lobbies seeking nuclear arms. Lawrence Wittner (1993-2003), in his immense three-volume study of anti-nuclear movements, draws our attention to the vital role of domestic civil society pressure groups, and, a political discourse that foregrounds ethical and moral concerns about the possession and use of nuclear weapons. He argues persuasively that the early renouncers, countries that decided not to develop weapons programmes in the 1950s and 1960s, cannot be understood without appreciating the importance of domestic civil society mobilisation and ethical concerns in forcing a political leadership to forego the desire to acquire nuclear weapons. The power of public sentiment – now operating transnationally – was also visible in the all-too brief moment between the end of the cold war and the signing of the Comprehensive Test Ban Treaty (CTBT), as French and Chinese decision-makers probably remember only too well. During those heady days, a range of transnational civil society groups and non-nuclear states made abundantly clear their preference for universal nuclear disarmament. A decade-long global mobilisation of anti-nuclear sentiment foregrounding ethical, moral, and legal concerns led to the historic 1996 ruling of the International Court of Justice (ICJ). The ICJ ruling came in response to a formal request from the UN General Assembly for an advisory opinion on the legality of nuclear weapons; during the hearings, an

unprecedented 45 countries and the World Health Organisation spoke on the issue, "by far the largest total in the Court's history" (Burroughs 1997: 12).

What this all adds up to is that there are distinct reasons for renunciation, rollback, and reversal, reasons that additionally vary by time period. Countries that gave up the search for nuclear weapons in the 1950s and 1960s did so for reasons quite different from those that did so in the 1990s. Side-stepping the question of why civil society and the content of political discourse are given short shrift in dominant explanations of renunciation, I wish to emphasise that explanations for why countries give up nuclear weapons do not correspond to the reasons why they want to acquire nuclear weapons. Security, bureaucracy and prestige, as factors explaining acquisition are joined by very different partners explaining renunciation, namely, coercive diplomacy, international recognition, historical context, profound domestic political transformations, domestic and transnational civil society movements, and, ethical concerns. One set of factors helps explain why countries seek to acquire nuclear weapons while an entirely different set of factors must be used to explain why they give them up. The methodological complications such a finding poses for any theorisation of nuclear power are obvious.

Methodological Complications

Among these complications is the importance of the timing of decisions to acquire or reject nuclear power. Although the mid-1950s and the early 1990s might both be characterised as periods when the number of nuclear renouncers was greater than the number of nuclear acquirers (renunciation dominated acquisition), the reasons why this was so in each time period are quite different. Similarly, although the late 1940s and the late 1990s might be characterised as periods when acquisition was dominant over renunciation, again the reasons for why this was so in each time period are quite different. This finding hugely complicates our usual linear assumption about the influence of the past on present and future. This goes beyond merely suggesting that the historical time period within which important events take place matters more than analysts have paid attention to, it is also a proposal for considering seriously the *scale* of analysis.

If we can no longer make the familiar assumption about the passage of uniform linear time between time periods, we cannot generalise from longitudinal or time series-based arguments to explain national acquisition or renunciation of nuclear power. If global context – the specific historical period – matters, every national act of acquisition or renunciation is reflexive: it changes the meaning of these actions for all other countries. For example, once India and Pakistan came out of the nuclear closet in 1998 and declared themselves nuclear weapons states; once North Korea was able successfully to pull out of the Nuclear Non-Proliferation Treaty (NPT) and conduct a nuclear test, the meanings of nuclear acquisition changed for everyone. Without giving due regard to the current interpellation of India and North Korea as de facto (but not legal) nuclear weapons powers, we cannot understand why Iran might seek to acquire

nuclear weapons. In other words, understanding nuclear power requires analysis at two levels, the national and the global, at the same time. National explanations are of necessity domestic politics- and institution-dependent. In that sense they are well served by traditional case study approaches that assume uniform linear time, while bearing in mind there may be non-intersecting historical trajectories leading to the present: one for acquisition and another for renunciation. Analysis of the global scale, on the other hand, requires treating certain historical moments as world-historical moments (Tilly 1989; Wallerstein 1979). At these moments, the meanings of certain actions are given definition at a global level, which shapes future behaviour in ways that are not predictable by nation-scale institutional and political inertia. Moreover, it must be recognised that what is significant at a global level may be different for acquisition and renunciation narratives.

Defining Nuclear Power

It is obvious that a comprehensive understanding – what might be called a theory – of nuclear "proliferation" must include arguments not just for why countries seek nuclear weapons, but also why they give them up. Moreover, such an understanding should also include a coherent explanation for why the vast majority of countries in the world do not seek to acquire nuclear power at all, whether in the form of "civilian" nuclear power reactors for generating electricity, or, facilities for building "military" nuclear explosives. If there are 56 non-nuclear weapons countries that conduct some kind of nuclear activities (Rublee 2009, Table 2: 31), a number to which we can add nine nuclear weapons states, this total of 65 is less than half the number of countries of the world as measured by membership in the United Nations Organisation. Indeed, I want to extend Rublee's (2009) argument, which focuses on "latent" nuclear powers, to propose that that this datum – that the *majority* of the countries of the world show no interest in acquiring nuclear weapons or nuclear power of any kind – is the most important consideration in need of explanation.[2]

Under these circumstances, the politically loaded term nuclear "proliferation" is far from adequate. Proliferation begins from the premise that countries that can, will, which is clearly historically fallacious. As already mentioned, the majority of states in the world do not seek to develop nuclear resources. Even among the smaller set of nuclear-capable states, only a small minority seek to build nuclear weapons. It is worth noting that the logic that those who can, will, is primarily articulated by countries that have built nuclear weapons – notably the United States – countries that project their decision-making rationales onto all other states regardless of all the contradictory historical evidence.

It is important to note that even the analytic focus on nuclear-capable countries is flawed. While it may seem pragmatic to limit one's study to those countries that have the means to build nuclear weapons, such a research design ignores the critical factor that countries may have made explicit decisions *not* to enter the world of nuclear power under any circumstances. Such decisions are not merely a question of resources, as is sometimes – too easily – assumed: we would hardly be concerned with North Korea, if that were the case. The decision not to engage with

nuclear power is as important as the decision to develop nuclear power (in whatever form). "Acquiring" or "renouncing" nuclear power is the outcome of a set of decisions that far exceeds any simple formulation of building weapons or producing electricity. In other words, there is no alternative to considering the entire range of state actors, haves, could-haves and don't-wants, if we are to approach a comprehensive understanding of nuclear power.

Nuclear proliferation as a term or concept is far too compromised to be of use in this effort. Hence, this paper will use the term *nuclear power* instead. The use of the term nuclear power seeks to do more than compensate for the conceptual limits of "proliferation". It seeks also to open up the boundaries of what is defined as a country's nuclear technological complex. All too often, the "nuclear" is identified as a technological apparatus segregated from the social, political, cultural, and economic institutions of the country. In fact, nuclear power is always much more than a technical instrument whose meanings can be easily established (an instrument either to build weapons or produce power): as I have argued elsewhere, nuclear power is, simultaneously, a "material force, site of resistance, techno-political space, symbolic and cultural referent, and state practice" that always exceeds easy categorisation (Abraham 2009b: 2).

Nuclear power is both political economy and symbol: It is both a material apparatus (including reactors, ancillary industries, thousands of unskilled and skilled personnel from uranium miners to radio-chemists) and a discursive condition – ranging from slogans proclaiming "power too cheap to meter" and symbols of national scientific achievement to dystopic cultural icons such as Godzilla – that fundamentally shapes how societies mediate their relation to technological modernity (Weart 1988). Nuclear power always comprises a material and technical dimension as well as a symbolic and discursive dimension. In its simplest formulation, the material dimension combines the scientific knowledge and technological apparatus that permits atoms to be split, thus opening the way for the energy generated to become a resource in human affairs. The discursive condition of nuclear power, drawing on Foucault, is a "formation of power/knowledge constituted through technical, organisational, political, and cultural discourses" Kinsella (2005: 57). Studying nuclear power in ways that limit the problem to nuclear weapons acquisition becomes *ideological* as it arbitrarily narrows the frame of reference and denies the material and discursive embeddedness of nuclear power within national and international socio-political scales and frames.

Nuclear Exceptionalism

By "ideological", I mean neither a covert conspiracy nor false consciousness. Rather, I seek to highlight the dangers of internalising nuclear power's own view of itself, a view that starts from the premise that nuclear power is unique, singular, historic: in a word, exceptional. Nuclear power was, at its creation, marked as exceptional because it appeared to fulfil, finally, the Baconian promise of man's domination of Nature; because its complex development was coterminous with new scientific knowledge; because of its destructive power and expense of production; because of its alleged effect of shortening the Pacific War; because

of its monopoly by the US; because of its long-term radiological and health effects; and because of the promise it made to transform lives positively. Over time, these characteristics acquired a special status that led to the nuclear complex standing apart from other social institutions and cultural frames, even as these original markers of difference became less distinct. This apparent separation of the nuclear domain from other areas of social life today should be understood as the result of the sedimentation of these original conditions into a specific nuclear discourse working through discrete material practices.

In an important contribution, Kinsella (2005) summarises the condition of nuclear power's *separation* from other political formations by identifying four "master themes" of nuclear discourse that "continuously evoke and complement each other within a dense network of meanings and mutual implications" (52). The first thematic is *mystery* and a corresponding discourse of mystification. The mystery of the atom comes from the association of atomic power with "the primordial, the fundamental and the sacred" (54). The second thematic is *potency.* Potency is a trope that has structured nuclear discourse ever since the use of nuclear weapons over Hiroshima and Nagasaki. The third thematic is *secrecy*, a structuring condition long associated with the history of the nuclear weapon, starting with the super-secret Manhattan Project and ironically reaffirmed by the shadow of espionage that always accompanied that effort. Finally, *entelechy*, a concept associated with "outcome, endpoint, consequence, fruition, perfection, culmination, implication, destiny and fate" (64). Drawn from Aristotle, this thematic naturalises the drive towards greater and more powerful forms of both prosperity and destruction through the trope of (technical) perfection. Bigger, more efficient and safer reactors join with larger, more destructive and targeted weapons systems to define the necessary and inevitable outcomes of nuclear power. These four thematics, Kinsella argues, together produce a nuclear discourse that powerfully shapes the limits to how society imagines nuclear power as well as explains how nuclear power *separates* itself from other power structures and formations.

An everyday example of the separation of nuclear power from other social institutions can be seen in the gap between the official narrative of nuclear power and its recorded material histories. All official nuclear histories describe their country's development of nuclear power in terms that privilege independence, autonomy, and self-reliance. In fact, there has never been a truly independent nuclear programme anywhere in the world, a fact rarely acknowledged by official nuclear narratives. Nuclear acquisition around the world is a story of interstate and cross-national collaboration, not independent action. Without claiming that individual countries would not have been able to develop nuclear weapons without international help, it is important to note that in fact none of them reached this end without it. International assistance in the form of explicit collaboration, shared expertise, blueprints, shortcuts, and material assistance (such as heavy water and nuclear fuel) made reaching the goal of nuclear weapons quicker and cheaper than would have been the case otherwise. The US atomic effort would not have been the same without the material aid of Canada, Britain, and France, not to

mention the efforts of individual émigré scientists from all over central and eastern Europe (Kevles 1987; Rhodes 1986). The Soviet Union could not have come as quickly to nuclear power without the unwitting help of the US and Britain, expressed through efficient Soviet espionage (Holloway 1994). Britain's nuclear project was assisted by Canada, Norway, émigré scientists, and the US, the latter albeit reluctantly (Gowing 1964). France had aid from its colonies, especially Niger, and Norway and Britain (Hecht 1998, 2009). China likewise, benefited enormously from Soviet help (Lewis and Litai 1988). Israel had help from France, the US and South Africa (Cohen 1998). South Africa had help from France, Britain and Israel (Liberman 2001; deVilliers et al 1993). India had help from Britain, Canada, and the US (Abraham 1998, 2006; Perkovich 1999). Pakistan had help from China (Cirincione et al 2005). North Korea had help from Pakistan as did Libya and Iran (Niksch 2005). These are examples of direct interstate assistance derived from public sources. There was indirect help as well, especially for the second and third generation of nuclear powers, through international training, bilaterally promoted resource and technology transfers, and assistance via the international atomic regime (Krige 2006). Safeguarded civilian nuclear power systems trained engineers whose expertise could, in some cases, carry over into a weapons programme. The flow of scientific and technical knowledge through normal channels of scholarly communication, including journals and conferences, constitute another indirect form of international collaboration. As a result, no nuclear power can credibly claim to have a wholly independent nuclear project, though again, it is worth repeating, that with time, resources, and effort, an entirely independent project was hardly beyond their means.

No country, it is often asserted, would share these priceless weapons (or their manufacturing secrets) with other countries. Yet, the history of nuclear power from its inception shows exactly the opposite story. That this lack of independence might come as a surprise to some is testament to the power of neo-realist thinking, which postulates an anarchic world requiring self-help, with nuclear weapons standing for the most security-enhancing form of international deterrent power. Theories of structural realism notwithstanding, self-help was not the way by which any country has acquired nuclear weapons, a situation that can lead to awkward outcomes as national pride is often closely linked to the representation of nuclear weapons as indigenous instruments of national power. The extent of international collaboration involved in the histories of all nuclear weapons-possessing states requires countries to engage in considerable effort to *cover up* this shared past in order to pass these weapons off as purely local and indigenous products (Abraham 1998, 2006).

The Ambivalence of Nuclear Power

Nuclear power is *ambivalent*. It is ambivalent because the technology to produce nuclear power cannot fix outcomes in advance: nuclear technology is *dual use,* to borrow the term of art. Nuclear power has been, and will be, both civilian and military at the same time.

Acknowledgement of this condition must be the starting point for all nuclear studies and analysis. Ambivalence has been a foundational characteristic of nuclear power since its inception. The ambivalence of nuclear power is exhibited in multiple domains. Highly nationalistic projects to generate nuclear power were always multinational in practice. Wastes from reactors to produce electricity – civilian reactors – could be and were used to produce the fuel for nuclear explosives. Civilian reactors were used as models to build nuclear-powered naval submarines. The line between the civilian and the military, exclusive and common, national and international, progressive and dangerous, has been transgressed repeatedly, in both directions, from the beginnings of the atomic age and up until the present. This leads to an internally divided or split discourse about nuclear power, a split which is misleadingly represented as "dual use". Nuclear discourse always represents its object, nuclear power, in the form of an irreducible binary. Although dominant nuclear discourse would like to sweep away this split, binaries always structure the expression of nuclear power. As with all discursive binaries, the split is not innocent (Said 1978). One element of the binary is constituted as a positive valence, the other loaded with a negative weight. Nuclear discourse works constantly to privilege the positive/dominant valence of nuclear power and to marginalise its negative/devalued partner. No small amount of work, sometimes bleeding into violence both epistemic and real, must be done in order to suppress the shadow meanings of nuclear power (Spivak 1999). In other words, these binaries are far from stable. Breakdowns in the dominant meanings of nuclear power – from linguistic overload to cataclysmic events like Chernobyl – are commonplace and constitute crises that must be repaired for discursive coherence to be restored.

For example, when we speak of nuclear power, we make a distinction between *political* and *military* weapons, the first seeking to reassure an anxious world, and perhaps nuclear strategists as well, that nuclear weapons will not and perhaps even cannot be used. At the same time, for these political weapons to fully inhabit their political roles, they must be seen to be working, effective, reliable, and ready for use. In other words, they have to be seen as capable in military terms. Their use-value is what makes them political weapons; their exchange-value depends on their imputed military efficacy. These two contradictory values cannot be separated from each other in any meaningful way. Nuclear power invokes the hoary binary of the *modern/future* and its archaic shadow, the *traditional/past*. From the US to France, from Israel to India, the modern-traditional binary is always present in the wake of the nuclear. The nuclear reactor discursively represented as an immensely powerful instrument of change coupled with its now-iconic (perhaps totemic?) architectural form comes to embody the future in the present. Especially in the postcolonial world, the modern has long stood as a metaphor for a desired future, and becomes weighted with public anticipations for a better life (Abraham 1998). The failure of nuclear power as a means to economic development diminishes the legitimacy of this object, leading to its redefinition as a means to national security and international recognition. Nuclear power as modern and future may strive constantly define the traditional and past as a flexible receptacle for depositing historical and cultural waste, but the crisis of modernity makes this struggle impossible to win.

We see the split in nuclear discourse repeat itself in the quotidian distinctions made between *expert* and *public*, the first empowered to speak authoritatively about nuclear power, the other a passive, uninformed (and often deemed recalcitrant) recipient of the effect of this power. Expert and public are produced through the institutional structures that govern nuclear power, the elite cadre of scientists and technocrats that produce nuclear power who are bracketed off from society via social, political, and institutional boundaries, and the masses who are excluded from this formation, but who are expected to remain its passive consumers. We have already seen how these distinctions are discursively propped up through Kinsella's thematics of mystery, potency, secrecy, and entelechy. What Kinsella stops short of acknowledging is that expertise, by itself, cannot eliminate the public's radical doubts about the efficacy of nuclear power as exhibited by the constant rejection of nuclear power by local communities around the world. Among the most familiar of nuclear binaries is the now well-established distinction between *civilian* and *military* uses of nuclear power, a distinction that is written into the NPT. With every development of civilian and peaceful forms of nuclear capability, guaranteed as a right under the NPT, a country gets closer to the means to build nuclear explosives that can be used for other purposes. After the first two nuclear weapons powers, every country that has built nuclear weapons has approached them through so-called "civilian" technologies, building research reactors that double as incubators of military means. While enriching uranium above 20% is now widely considered a danger sign that a country is using civilian technology to seek to build weapons, in fact controlling the means to enrich uranium is far more important than the level of enrichment reached. In the end, only self-regulation keeps the terms civilian and military in their "proper" place.

The technical characteristics of nuclear power are no different. Consider the technical distinction between the *front end* of nuclear power – the combination of mines, fuel, technology and reactors that generate electric power – and the so-called *back end*, from which is derived the means to build nuclear explosives, the predominant focus of the non-proliferation regime, as well as the post-burn up phase of the fuel cycle which is loosely categorised as waste. The distinction between front and back-ends is not a meaningful technical distinction – it is a function of using the nuclear reactor as a symbolic boundary – nor is it an accurate description of the fuel cycle, as it implies an irreversible linearity. In fact, nuclear fuel rods are usually recycled and replaced in the reactor for burn up in most reactor designs. Moreover, the back end is usually be the front end for the next cycle of nuclear power, whether being used to fuel a breeder reactor or used to generate weapons grade fuel. Non-proliferators are focused on the dangers of the back end for fear that that waste may end up serving the interests of covert proliferators. The missing front end is, however, the site of largely unrecognised environmental devastation. Mining and refining facilities for radioactive ore have laid waste to indigenous habitats in Australia, Africa, Canada, US and India, among other countries, and has destroyed the lives of thousands of unskilled nuclear workers, miners, and their families who work and live in conditions that expose them to immediate health risks as well as long-term genetic damage. The invisibility of the front end, as Gabrielle Hecht (2009) points out, allows us to forget how many African countries are joined to the global nuclear commodity chain.

The apparent distinction between the nuclear *test* and the nuclear *explosion* – whether accidental, peaceful or belligerent – similarly maps onto a distinction between acceptable and unacceptable, the first indicating benign (or at least sanctioned) intent and the latter a set of events that must be proscribed (Abraham 2006). Nuclear tests differ from these proscribed explosions only by the stated intention that they are not belligerent in intent; in fact there is little to choose between them. In the early nuclear years, human life, both military and civilian was regularly exposed to the effects of nuclear tests/explosions. As a number of studies have shown on the ongoing environmental and biomedical impact on the nuclear testing ranges in the US, the hundreds of nuclear tests that have been conducted in the American West – what Valerie Kuletz (1998) has called the "Tainted Desert" – constitute a standing threat to the sustainability of the environment and the integrity of communities of humans and other life forms. The distinction between the explosion and test mutates into a specious temporal/spatial distinction, namely, the extent of destruction measured after the singular event of a Hiroshima or a Chernobyl (both now metonyms for the immense power of deliberate nuclear destruction) versus the extent of differently deliberate destruction measured over multiple generations and spatial scales in New Mexico, Nevada, western Sahara, and the Pacific Ocean. The nuclear impact on these latter regions has recently returned to public attention with important new studies that have allowed the voices of anti-nuclear activists, ethnic subalterns, animals, birds, and insects to be heard in partial and limited ways (Masco 2006).

The impossibility of controlling the meanings of nuclear power, as shown above, speaks to the semantic and material excess produced by every deployment of nuclear power. In other words, the ambivalence of nuclear power is a *permanent* feature of the nuclear sign, exhibited in discourse and produced through its material form. Much as sanctioned nuclear discourse would like to define itself solely through one node of the binary – modern, expert, civilian, political, back-end, test – the shadow presence of the other, more unsettling, meaning of nuclear power creeps through its every deployment.

For the cultural critic Homi K Bhabha, writing in the context of colonial discourse, ambivalence is not a dialectical process leading to "the contestation of contradictories [or] the antagonism of dialectical opposition". It is, rather, a "splitting" of discourse, a denial of the possibility of either one or the other side of now familiar binaries; such a situation results in "multiple and contradictory belief". In other words, discourse can never limit itself to one or the other meaning, one side of the dyad does not prevail over the other. The "strategy" of ambivalence, as Bhabha calls it, is an effect of the inability of discourse to fix itself unambiguously and not an effort at deception or camouflage. Recognising ambivalence requires "articulating contradictory and co-eval statements of belief" *at the same time* (Bhabha 1994: 31). It is easy to see how the ambivalence of nuclear power produces a radical

uncertainty for nuclear proliferation policy: after all, what this means is that it can never be known in advance with any degree of certitude what the "true" intentions of a potential nuclear state might be. Radical uncertainty corresponds to what might be called the *absolute excess* of the discourse of nuclear power (Derrida 1978). Uncertainty-excess leads to the following policy outcomes.

Ambivalence and Uncertainty: The Policy Question

Nuclear ambivalence cannot be resolved – no matter how informed international observers are – but, in the realm of policy, uncertainty must be. The ambivalence of nuclear power has the ability to drive policymakers mad with uncertainty. When each successful civilian national nuclear programme has contained within it the means to produce belligerent nuclear explosives and weapons, the anxiety about determining the *actual* objectives and intent of these programmes is extreme. The absence of overt signs of cheating might only mean that true intentions have been successfully camouflaged. In order to make effective policy, policymakers must decide for themselves what the "true" intentions of countries are; even in the absence of conclusive proof of mal-intent, good policymaking will err on the side of caution and assume the worst. Such a response to nuclear ambivalence has, today, the effect of producing a self-fulfilling outcome.

In a recent article, Seigfried Hecker (2010) discusses the North Korea decision to build a gas-cooled graphite-moderated natural uranium reactor in the 1960s. "It was a logical choice", he notes, because British plans for such reactors were readily available at the time, and, it was too complex and expensive to enrich uranium, making natural uranium-fuelled reactors far more cost effective and practical. He goes on to say, "So, whereas Pyongyang's choice of gas-graphite reactors for its energy programme was logical, it was also the best choice to develop a nuclear weapons option" (45). Hecker's peculiar phrasing reflects both the ambivalence of nuclear power and the uncertainty it produces. Did North Korea always intend to build nuclear weapons? Would they have not done so if they had opted for another reactor design? Did the reactor design shape North Korean behaviour, rather than vice versa? There is no evidence presented to suggest any of these possibilities. Hecker says it was a "logical choice" at the time for pragmatic, economic reasons, but goes on to explain the wisdom of this choice retrospectively. Given that we now know that North Korea has built nuclear weapons, the original choice of a gas cooled natural uranium reactor makes even more – an excess of – sense. By this overdetermined logic, implicit in a pragmatic decision made decades of years ago was an unconscious drive to proliferate. What policy says is that there is more than just "logical choices" at play in choosing gas-cooled reactors, this choice is also expressive of a latent desire to build nuclear weapons, *as we now know*. Where does this latency come from and whose desires does it express? The real "logic" here is the unspoken but accepted answer to these questions: the assumption that all countries have a latent desire to build nuclear weapons. But as has been repeatedly pointed out, this assumption is not borne out by facts on the ground. The majority of countries do not seek to develop nuclear power.

Given the lack of empirical evidence, the post hoc imposition of the "logic" of nuclear weapons proliferation can only come from a policy mindset that abhors uncertainty and requires, to be taken seriously, the presentation of the worst case as most likely. Today, uncertainty has now been resolved. North Korea has shown the ability to set off nuclear explosives. Its prior choice now makes even more sense, according to the logic of nuclear proliferation. The international community was correct to assume that North Korea always wanted to build nuclear weapons and all actions taken with this assumption in mind are thus appropriate. The policy response to uncertainty has been shown to be correct, albeit retrospectively.[3]

Consider another example, the Indian choice of a natural uranium-heavy water moderated reactors. This reactor choice and the battle to keep the CIRUS reactor unsafeguarded was explicitly made in order to keep options open: it was a choice made in order not to have to choose (Ramanna 1991). This reactor choice was made in order not to foreclose the possibility of building weapons in the future. And thus was inaugurated the long and torturous debate about the nuclear option, producing by extension, uncertainty galore. So, how was uncertainty resolved? I have elsewhere argued that a structural imperative for the second round of Indian tests in 1998 was the impossibility of convincing the international community that India's 1974 "peaceful nuclear explosion" was only what was called at the time, a "demonstration" (Abraham 2009a). India's political leadership insisted that the 1974 test showed capability but was not intended to show intent or desire to build nuclear weapons. Notwithstanding these protestations, a military intent was imputed to the PNE and, from that point onward, international behaviour towards India was shaped on the basis that it was a de facto nuclear weapons power. The more India protested this meaning, the less it was believed. Sanctions set in place in the 1970s, when India demonstrated the ability to set off a nuclear explosion, were only removed 30 years later, when India declared itself a nuclear weapons state. The 1998 tests were, from this standpoint, designed to end uncertainty. And they did. In 1998, India proved – retrospectively – that the international community was right to treat it as a nuclear weapons power from 1974 onwards. The multiple plausible meanings of a nuclear demonstration/peaceful explosion were reduced to a single "actionable" or practical meaning. India had tested a nuclear device: hence, it must be seeking to build an arsenal of nuclear weapons. Uncertainty was resolved: policy now knew what to do.

Did India seek to become a NWS in 1974? On balance and considering all the evidence available, I think not. Did India seek to be recognised as a NWS in 1998? There is little doubt that it did. Jaswant Singh, foreign minister at the time, explained that India had paid the price for being a proliferator, when it had not sought to build weapons, for 25 years. Hence, it might as well become one: it had nothing to lose. The single-minded international reaction to India's 1974 test helps explain its behaviour in 1998.[4]

In one case, a retrospective justification is offered to explain the logic of reactor choice; we are asked to accept that the DPRK has (always had) a latent desire to build weapons. In another case, an underground nuclear explosion is assumed to have no other meaning than to announce that a weapons programme is underway. Policymakers seeking to restrict the number of new

nuclear powers assumed the worst and treated North Korea and India as if they had always sought to build nuclear weapons. The common starting point, in both cases, was to assume that there is a universal desire to built nuclear weapons, a desire barely held in check by the legal and coercive means of the non-proliferation regime. In both cases, nuclear weapons were eventually built, retrospectively seeming to show that the international community was correct to think the worst.

My counterfactual question asks, what is the likelihood that these countries have taken this step without this policy response? Had India and North Korea been drawn into the dense web of international relationships that nuclear commerce, non-proliferation safeguards, and scientific interaction entails, not only would there have been far more reliable information about what the "true" intentions of these countries were, but the multiple costs of breaking these ties would be far more real to these potential proliferators. The cost-benefit analysis of "going" nuclear would be radically altered, the domestic agents with something material to lose far greater in number, and the outcome of proliferation far less likely. Without these ties to the international system, and already paying the price of being considered an illicit actor, the logic of "what have we got to lose" becomes compelling.

Policymaking under conditions of radical uncertainty must assume the worst. What is defined as "responsible" policy has no other choice. This is the only way of resolving the radical uncertainty generated by dual use nuclear technologies. Seen from the other side, this assumption produces a dynamic that leads nuclear capable/latent nuclear weapons states to – to borrow a psychoanalytic metaphor – acknowledge their unconscious desire to build a nuclear arsenal. Although there is no hard evidence that these countries have made a decision whether to build nuclear weapons, they are faced with a situation where the value of nuclear weapons as an international currency of influence and power is being constantly reaffirmed, and, they find themselves paying a price for having built nuclear weapons illicitly. The ultimate decision in two cases, DPRK and India, reaffirmed by domestic compulsions and interests, was to formally declare themselves nuclear powers, following a series of underground explosions. Whether these countries would have decided to build nuclear weapons in the absence of this global policy response can never be known, but in thinking about this possibility, we must return to the one overriding truth regarding nuclear power. The majority of countries in the world have chosen not to have anything to do with nuclear power.

Conclusions

This paper has argued, first, that no comprehensive theory of nuclear proliferation exists. Such a explanation would have to include arguments to explain why some countries build weapons (the area that has received the most analytic attention), why most do not, and, why others have given up the idea of building weapons, all within a single formulation. We are far removed from such a comprehensive explanation: indeed, whether such a "theory" is even possible is an open question, given that there are discrete and mutually exclusive explanations for why countries

acquire nuclear weapons and why they give them up. This paper proposes instead that the most important puzzle for future analysts of nuclear power to address is why the majority of the world does not exhibit any desire to acquire nuclear weapons or nuclear power.

The paper then turns to examine the implications of the literature's near single-minded focus on countries that seek to build nuclear weapons. It argues that such a focus is the result of countries with nuclear weapons projecting their own rationale for developing nuclear weapons onto all others, in spite of the complete lack of evidence that this desire exists. Theoretical analysis, at this point, has morphed into policy prescription and action that seeks, above all, to restrict the number of new nuclear powers.

The paper argues that the single greatest weakness of conventional policy analysis is the inability to address the inherent *ambivalence* of nuclear power. Ambivalence is often glossed in the literature as "dual use" technology; the use of the "dual use" formulation misleadingly transfers attention to the operator or manager of technology rather than see it as a structural feature of the technology itself. Thus, we see non-proliferation policy formulations starting from the alleged lack of rationality or suitable moral condition of the national leadership of countries of concern. For example, are we confident that Kim, Saddam, or Ahmedinijad are reliable and rational actors? Policy prescriptions, built around worst-case scenarios, must always answer in the negative to this question.[5] By contrast, this paper argues that ambivalence is not a choice under the control of good or bad leaders. It is a structural feature of the technology; regardless of "good" or "bad" technological choices made at different points of time, the ambivalence of nuclear technology does not go away. Technological ambivalence, at this point, becomes policy uncertainty; by definition, uncertainty is anathema to policy and has to be resolved.

Two examples are explored to assess the effect of uncertainty on policy: the recent declarations by DPRK and India that they are nuclear weapons states. In both cases, this paper shows, policymakers assumed long before the actual decisions were taken that these countries intended to build nuclear arsenals. The international community took "appropriate" action, namely, a coordinated policy of sanctions and technological denial, based on the conclusion that these two states were illicit nuclear powers. Retrospectively, when both countries declared themselves nuclear weapons states, the international community's pre-emptive policy justified itself. This paper argues that pre-existing sanctions and negative policy responses from the international community played an important role in creating an environment that strikingly altered the domestic cost-benefit equation in both countries. The impact of years of sanctions and denial created a context where the decision to "go" nuclear could begin from the premise that there was nothing further to lose. In sum, nuclear ambivalence created policy uncertainty; uncertainty led to worst-case projections; actions taken on the basis of those projections led to the outcome the policy was trying to prevent. This undesired consequence is a direct expression of the contradictions of contemporary nuclear non-proliferation policy and theory.

NOTES

1 There are additional strands in the literature that bear directly and indirectly on this question, namely, on the possible role of the NPT in inhibiting the desire for nuclear weapons (Potter 2010) and on the existence of a possible "taboo" on the *use* of nuclear weapons, that will not be addressed here (Tannenwald 2007).

2 A comprehensive understanding of nuclear power would need to incorporate both (a) nuclear haves and; (b) nuclear have-nots. Nuclear have-nots may be further divided into; (c) states that have the means to produce weapons but have made explicit and categorical decisions not to do so; (d) states that do not have the means (currently) to produce weapons and who have made an explicit and categorical decision not to seek to do so – both "renouncers"; (e) states that have the means to produce weapons but have not explicitly decided whether to do so or not ("latent nuclear powers"). A "theory" must go beyond explaining what is now termed "nuclear proliferation" to include all these varieties of nuclear relations.

3 It should be noted that this sleight of hand – from uncertainty to clarity based on something beyond logic – is an old trope of nuclear discourse. It carries the legacy of a once commonly assumed truth, namely, that leaders of the developing world as a group were unlikely to be up to the intellectual and moral demands of managing the awesome responsibility of possessing nuclear weapons. This additional reason for keeping the numbers of nuclear powers small was once international common sense and summarised by its critics as nuclear apartheid. It took the Indian and Pakistani bomb projects to end that particular line of argument as a blanket response to new nuclear weapons states, though even that change did not happen overnight.

4 Note that I am not arguing that this was the only reason for the 1998 tests. Rather I propose that the hostile international response to 1974 is an important, and relatively unacknowledged, factor shaping the thinking of the political and scientific leadership that decided to test in 1998.

5 Taking the opposite tack, that India was a "good" and responsible international player was a crucial sub-text in the discussions leading up to the US-India nuclear agreement that "rewarded" India in spite of its alleged violation of international nuclear norms.

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