Why the Development of Epistemic Community Does Not Necessarily Lead to Nuclear Arms Control Cooperation:

A Case Study of U.S.-China Cooperation in Comprehensive Nuclear Test Ban Treaty (CTBT) Negotiation

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Introduction: Rethinking the Role of Epistemic Community in Promoting International Cooperation

The concept of epistemic community has been used to describe a “network of professionals with recognized expertise and competence in a particular domain and an authoritative claim to policy-relevant knowledge within that domain or issue-area”.¹ Epistemic communities have common characteristics: shared sets of causal and principled beliefs, a consensual knowledge base, and a common policy enterprise.² Scholars who study international cooperation are interested in epistemic communities because they believe that epistemic communities can use their recognized expertise to influence policy-makers and promote those policies that lead to international cooperation.³ They argue that “international issues are increasingly characterized by their

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technical aspects, complexity, uncertainty, and interdependence” and “once the expectations and values injected by epistemic communities into the policy process are internationally shared, they help coordinate or structure international relations.”

Existing literature points out that “epistemic communities are likely to have the greatest effect in issue areas characterized by uncertainty, and those in which scientific communities may make plausible claims to technical expertise”. Nuclear arms control, for instance, is an issue area in which scientific and technical expertise is very much necessary and important for policy making. As is argued by Emanuel Adler, epistemic communities “played a key role in creating the international shared understanding and practice of nuclear arms control, which gave meaning to and helped coordinate expectations of superpower cooperation during the Cold War.” Adler’s study, however, focused on the U.S.-Soviet Union experience and told the story of how epistemic communities helped to usher in a new era of cooperation on nuclear arms control between the U.S. and Soviet Union that started with the Anti-Ballistic Missile Treaty (ABM) negotiations. The question is: can we draw a broad conclusion about the role of epistemic community in promoting nuclear arms control cooperation based solely on the U.S.-Soviet experience during the Cold War? Why have the U.S. and China not been very successful in nuclear arms control cooperation despite the many evidences that similar epistemic communities also exist in both countries?


Existing literature cannot answer the above questions, because there is a lack of understanding about the underlying mechanism that connects the development of epistemic community with international cooperation. This research, therefore, intends to shed light on the question of whether the development of epistemic community necessarily leads to nuclear arms control cooperation by examining the impact of domestic decision-making structure on epistemic community and its role in promoting international cooperation.

Recognizing that domestic decision-making structure may have important impact on what role epistemic community can play in promoting international cooperation, this study delineates two different levels of communication and interaction – domestic and international – among relevant decision-making actors. As is shown in Figure 1, blue arrows represent international communication channels, and red arrows represent domestic communication channels. This study examines three channels of communication during U.S.-China Comprehensive Nuclear Test Ban Treaty (CTBT) negotiations: international communication between U.S. and Chinese nuclear scientific communities, international communication between U.S. and Chinese nuclear security policy-makers, and domestic communication between the nuclear scientific community and nuclear security policy-makers in each country. This analysis of U.S.-China CTBT negotiation reveals that the role of epistemic community in promoting international cooperation is not certain and cannot be understood in isolation. Whether and to what extent the development of epistemic community leads to nuclear arms control cooperation is significantly influenced by how security policy-makers in respective countries interact with each other and what role the scientific community plays relative to security policy-makers in official negotiations.
Figure 1. Actors and Channels of Communication in Bilateral Nuclear Arms Control Cooperation

This research draws upon recently available Chinese documents and memoirs to help understand the exchange programs between U.S. and Chinese nuclear scientific communities. It also sheds light on how Chinese security policy-makers interacted with their nuclear scientists and how they dealt with U.S. negotiators during the two-year negotiation at the Conference at Disarmament in Geneva which led to the successful conclusion and signing of the Comprehensive Nuclear Test Ban Treaty in September 1996. In following sections, the paper firstly examines how bilateral exchange programs helped to put into shape an epistemic community that was comprised of U.S. and Chinese nuclear scientists. It identifies issue areas in which this epistemic community helped reach consensus in formal CTBT negotiation. The paper then analyzes the major issues that the U.S. and Chinese security policy-makers focused during formal CTBT negotiation and reveals the different priorities that scientific communities and security policy-makers each sought. By examining the disconnection between the two, this paper concludes that the development of
epistemic community did not have a direct causal relationship with U.S.-China cooperation on CTBT. The role of epistemic community is conditional on domestic decision-making structure.

**Exchange Programs and the Formation of Epistemic Community**

Before CTBT negotiations, U.S. and Chinese nuclear scientists rarely talked to each other. However, in 1993, in anticipation of the upcoming CTBT negotiations, the scientific communities of both countries felt the need to meet with each other and discuss potential technical issues before the formal negotiations started. Such exchanges continued in 1994 and during the negotiations in 95 and 96. Table 1 summarizes the major exchange programs. In fact, the exchanges were found so effective and beneficial to both countries that they decided to continue some of the exchange programs even after the conclusion of CTBT negotiations.

Table 1. Summary of Major Exchange Programs between U.S. and Chinese Nuclear Scientific Communities before and during CTBT Negotiation

<table>
<thead>
<tr>
<th>Exchange Program</th>
<th>Date</th>
<th>Participating Party (U.S.)</th>
<th>Participating Party (China)</th>
<th>Place</th>
<th>Issues Discussed</th>
</tr>
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<tbody>
<tr>
<td>Visits by Experts from Natural Resources Defense Council</td>
<td>June 1-4, 1993</td>
<td>NRDC*, LLNL*</td>
<td>IAPCM*, National Defense Information Center, CPAPD*, CICIR*, Beijing University of Aeronautics and Astronautics</td>
<td>Beijing</td>
<td>Nuclear strategy and policy, nuclear weapons maintenance programs, nuclear testing plans, technical problems facing CTBT, CTBT verification regime</td>
</tr>
<tr>
<td>Visits by Experts from National Academy</td>
<td>Early 1996</td>
<td>Committee on International Security and Arms Control (CISAC) of the</td>
<td>IAPCM*, experts and scientists from China’s nuclear weapons</td>
<td>Beijing</td>
<td>Nuclear stockpile stewardship, CTBT verification</td>
</tr>
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</table>

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<tr>
<th>Visits by Chinese Academy of Engineering Physics to the U.S.</th>
<th>March 23 to April 5, 1996</th>
<th>Cooperative Monitoring Center of Sandia National Laboratory, LANL*, NRDC*, FAS*, SBU*, Energy and the Environment Research Center at Princeton University</th>
<th>CAEP*</th>
<th>Multiple places in the U.S.</th>
<th>Treaty monitoring and verification technologies, CTBT on-site inspection, data analysis under CTBT, role of U.S. national laboratories in promoting arms control, peaceful nuclear explosion</th>
</tr>
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<tr>
<td>U.S.-China Lab-to-Lab Technical Exchange Program</td>
<td>1995-1999</td>
<td>U.S. national laboratories</td>
<td>CAEP*, NINT*</td>
<td>Multiple places in the U.S. and China</td>
<td>CTBT international monitoring system, CTBT data analysis, on-site inspection, CTBT confidence-building measures</td>
</tr>
</tbody>
</table>

* CPAPD: Chinese People’s Association for Peace and Disarmament  
CICIR: China Institutes Of Contemporary International Relations  
CAEP: Chinese Academy of Engineering Physics  
FAS: Federation of American Scientists  
IAPCM: Beijing Institute of Applied Physics and Computational Mathematics  
LANL: Los Alamos National Laboratory  
LLNL: Lawrence Livermore National Laboratory  
NINT: Northwest Institute of Nuclear Technology  
NRDC: Natural Resources Defense Council  
SBU: State University of New York at Stony Brook

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8 Zhao, Hong (赵宏). 2006. Track Two Dialogue between the U.S. and China on CTBT Negotiations (二轨外交与中美全面禁止核试验条约谈判), Institute of International Studies (国际问题研究所), Tsinghua University (清华大学), Beijing.  
9 Ibid.  
Knowledge-Sharing and Consensus-Building in Major Issue Areas within the Epistemic Community

These exchange programs offered opportunities for nuclear scientists from both countries to discuss theoretical and technical issues related to CTBT. They also functioned as an unofficial channel of communication through which the two countries could test out each other’s positions and receive feedback with regard to the other’s new positions. As American and Chinese nuclear scientists reached consensus in most of the important issues areas, an epistemic community was in formation.

Definition and Scope of the Treaty

On definition and scope of CTBT, Chinese scientists advocated for “zero yield” from the very beginning. They believed that allowing low yield tests would contradict the spirit of CTBT. In the U.S., however, there were a lot of different voices in domestic debate. During the exchanges, American scientists were cognizant of China’s resolve to stick to “zero yield” and Chinese scientists came to understand the intense debates within the U.S. on this issue. In 1994 the Jason Committee conducted a review on the necessity to continue nuclear tests and concluded that the U.S. did not need to conduct low yield tests in the future. Their conclusions were accepted by the U.S. government. As a result, although the official negotiating teams from the two countries had different positions, scientists from the two countries had largely reached a consensus on “zero yield”. Such a consensus provided much needed confidence for their governments and encouraged them to accept “zero yield”, and therefore paved the way for moving the negotiation forward.

**Activities Not Prohibited under the Treaty**

To ensure the successful conclusion of CTBT negotiation, one important prerequisite was that the treaty must allow the nuclear weapons states to be able to continue maintaining their nuclear stockpiles. Therefore, the nuclear scientists from the five nuclear weapons states got together and cooperated on creating a list of activities not prohibited by the treaty on the basis of their common understanding of science and technology. This list of not prohibited activities also helped strike a balance among the five nuclear weapons states on preserving their core national security interests without agitating nonnuclear weapons states.

**Peaceful Nuclear Explosion**

During CTBT negotiations, Chinese experts for a long time held the view that peaceful nuclear explosions should not be prohibited because they might have potential non-military values. They believed that through international monitoring and verification, peaceful nuclear explosions could be distinguished from nuclear weapons tests. American experts therefore analyzed the history of U.S. and Russian peaceful nuclear explosion plans, China’s technical capacity, the potential cost versus benefit of conducting peaceful nuclear explosion, and its impact on CTBT verification. On the basis of this transparent and comprehensive analysis, American experts suggested their Chinese colleagues give up the option of peaceful nuclear explosion. Scientists from both countries also conducted several meeting over this issue, particularly during the Chinese Academy of Engineering Physics’ visit to the U.S. in 1996.

**Effectiveness of CTBT Verification Regime**

The development of verification regime is one of the factors that played an important role in ensuring the successful conclusion of CTBT negotiation. Verification technology had been a
major concern for both Chinese and American scientists and became an important topic in their exchange programs since 1993. Scientists from the two countries also engaged in cooperative research programs in verification technology development in order to develop shared technologies and to increase experience and build confidence in verification technologies.

*Maintaining the Safety, Security, and Reliability of Nuclear Arsenals under CTBT*

American nuclear scientists played an important role in setting up the nuclear stockpile stewardship programs in the United States for the purpose of ensuring the safety, security, and reliability of U.S. nuclear arsenal. Compared with American scientists, Chinese scientists were more concerned about how to maintain their nuclear stockpile after CTBT enters into force. This was because the number of Chinese nuclear tests was only a tiny fraction of the U.S. and China had much less data than the U.S. on which they could rely to maintain their nuclear arsenal. As a result, maintaining the safety, security, and reliability of nuclear stockpiles without nuclear testing became a key topic in U.S.-China scientific exchanges. Chinese scientists learned in these discussions about how the U.S. conducted its nuclear stockpile stewardship programs in general and they seemed to become more confident about this issue after they came out of the discussions with their U.S. colleagues.\(^\text{12}\)

**Major Issues in Official CTBT Negotiations between U.S. and Chinese Security Policy-Makers**

*Peaceful Nuclear Explosion*

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\(^{12}\) Zhao, Hong (赵宏). 2006. Track Two Dialogue between the U.S. and China on CTBT Negotiations (二轨外交与中美全面禁止核试验条约谈判), Institute of International Studies (国际问题研究所), Tsinghua University (清华大学), Beijing.
When it came to formal negotiations at the Conference on Disarmament, it turned out that the major issues concerned by U.S. and Chinese security policy-makers were somewhat different from what their nuclear scientists were mostly concerned about. As is summarized in Table 2, the scientific communities in the U.S. and China were mostly concerned by five issues including the definition and scope of the treaty, activities not prohibited under the treaty, peaceful nuclear explosion, effectiveness of CTBT verification regime, and maintaining the safety, security, and reliability of nuclear arsenals under CTBT. During bilateral discussions, they had reached consensus on most (four out of five) of these issues.

In contrast, in formal negotiations during 1995-96 the U.S. and Chinese security policy-makers – represented by negotiators from their foreign ministries – paid most attention and spent most of the time on three major issues: definition and scope of the treaty, peaceful nuclear explosion, and on-site inspection approval procedure. Among the three issues that the U.S. and Chinese security policy-makers were mostly concerned about, the scientific communities managed to reach a consensus on the definition and scope of the treaty which greatly contributed to the successful resolution of this issue; the scientific communities, however, did not manage to resolve their disagreement over the issue of peaceful nuclear explosion. After several discussions with their American counterparts, Chinese nuclear scientists were still not convinced that peaceful nuclear explosion was of little practical use and they therefore wanted their government to support their view that peaceful nuclear explosion should not be prohibited under the treaty. This was the only disagreement between Chinese and American nuclear scientists among all the major issues debated in the negotiations. However, there is no evidence that Chinese negotiators listened to the suggestion of their nuclear scientists. After advocating for the right of conducting peaceful nuclear explosion in the initial negotiations, Chinese security policy-makers later dropped their
claim and decided to give in – a move that was in apparent opposition to the advice of their nuclear scientists.¹³

Furthermore, during the formal negotiations Chinese security policy-makers put most of their resources into defending their position on on-site inspection approval procedure – an issue that was regarded of little technical significance by scientific communities but was perceived as having extremely serious security implications by security policy-makers.

Table 2. Comparison of Major Issue Areas Focused by Scientific Communities and Security Policy-Makers

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<tbody>
<tr>
<td>Definition and Scope of the Treaty</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Activities Not Prohibited under the Treaty</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Peaceful Nuclear Explosion</td>
<td>Yes</td>
<td>No</td>
<td>Peaceful nuclear explosion is useful and should not be prohibited.</td>
<td>Yes</td>
<td>Agree to prohibit peaceful nuclear explosion</td>
</tr>
<tr>
<td>Effectiveness of CTBT Verification Regime</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maintaining the Safety, Security, and Reliability of Nuclear Arsenals under CTBT</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td></td>
<td></td>
</tr>
<tr>
<td>On-Site Inspection Approval Procedure</td>
<td>No</td>
<td></td>
<td>Yes</td>
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¹³ Ibid.
On-Site Inspection Approval Procedure

A major disagreement between the U.S. delegation to the CTBT negotiation and the Chinese delegation was over the procedure of approving on-site inspections. The U.S. was a strong supporter for the “3/4 red light approach” which means after a state submitted a request to conduct an on-site inspection, the on-site inspection (OSI) request would be automatically approved unless more than three fourths of the member states rejected the OSI within 24 hours. The objective of the U.S. and many other countries was to create a fairly easy approval procedure for conducting OSI. They wanted to make sure that the bar was set low enough so that on-site inspections would not be obstructed by a small number of countries. The concern of Chinese security policy-makers, however, was that such a low bar for conducting OSI would encourage some countries to abuse OSI by requesting and conducting many more OSI than necessary and therefore threaten the national security of the inspected party. In contrast, China proposed the “2/3 green light approach” which meant that an on-site inspection request would not be automatically approved unless two thirds of the member states agreed for it to go ahead. This would set a much higher bar to approving an on-site inspection.14

The Chinese leading negotiator Ambassador Sha Zukang was so concerned about OSI being abused by technically advanced states, he was vehemently opposed to the “3/4 red light approach”. The U.S. leading negotiator, Ambassador Stephen J. Ledogar was a strong proponent for the “3/4 red light approach”. Neither of them would make compromises and the dispute between the Chinese and U.S. ambassadors led the entire negotiations into a stalemate.15

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Both China and the U.S. were under tremendous and increasing international pressure. U.S. Ambassador Ledogar later withdrew from his original position and offered a step-by-step compromise by proposing a “2/3 red light approach”, a “1/2 red light approach”, and a “1/2 green light approach” at different stages of the negotiation. But Chinese concern about OSI abuse was so strong that they would not take yes for an answer. Instead, they chose to up the ante by raising the tension to the top leadership level.

Chinese President Jiang Zemin personally wrote to President Clinton stressing the importance of addressing China’s concern about the “1/2 green light approach” for approving on-site inspection request. China’s Vice Prime Minister Qian Qichen who was also the foreign minister met with U.S. Secretary of State Warren Christopher to convey the view that the treaty could not be passed without revision of the 1/2 green light approach.

The fight was ended only after the U.S. finally agreed to make a full compromise and accept China’s “2/3 green light approach”. It was lucky that U.S. and Chinese security policy-makers finally (and barely) reached an agreement on OSI approval procedure. However, the fact that the success of U.S.-China CTBT negotiation was almost solely determined by a single issue over which the U.S. and Chinese scientific communities had no influence again demonstrates the fairly uncertain role of epistemic community in this process.

**Conclusion: the Limits of Epistemic Community**

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During U.S.-China CTBT negotiation, U.S. and Chinese nuclear scientists held extensive exchange programs to consolidate their positions on important technical issues related to CTBT. They were very successful in achieving this goal. They together identified important issues to discuss and reached consensus on how these issues should be addressed for most of the issues (four out of five). The sharing of knowledge during the process clearly contributed to the formation of an epistemic community which paved the way for a productive CTBT negotiation.

However, there was no simple causal relationship between the development of this epistemic community and U.S.-China cooperation in CTBT negotiation. First of all, it turned out that the scientific communities and security policy-makers paid attention to different issues. U.S. and Chinese negotiators in Geneva spent most of their time and energy fighting on what should be the best on-site inspection approval procedure – an issue that was not a concern for the scientific communities but nonetheless became the most critical issue during the negotiation because of its perceived significance in the mind of security policy-makers.

Secondly, a closer examination of U.S.-China CTBT negotiation also reveals that on some of the most important issues, security policy-makers did not necessarily take the advice of their nuclear scientists despite the highly technical nature of the issues. On peaceful nuclear explosion, for instance, Chinese security policy-makers rejected the position advanced by their nuclear scientists.

It was not only the Chinese nuclear scientists who possessed insufficient influence over their security policy-makers. American nuclear scientists did not seem to be able to penetrate the mind of their security policy-makers from time to time as well. The U.S.-China Lab-to-Lab Technical Exchange Program, after being successfully run by American nuclear scientists for years and
being regarded as having a very positive impact on U.S.-China nuclear transparency, was suspected by U.S. Congress as being used by China as a channel for espionage. The Cox Report and following legislative measures effectively ended the Lab-to-Lab and all other exchange programs between American and Chinese nuclear scientific communities.\(^\text{18}\)

This analysis shows that the development of epistemic community does not necessarily lead to international cooperation even in issue areas of high technicality. In the area of nuclear arms control, the impact of epistemic community in promoting international cooperation depends highly on the interaction between security policy-makers and on the relationship between scientific communities and security policy-makers. In terms of policy implication, this analysis shows that the current notion that the development of epistemic community would gradually increase mutual understanding and ultimately contribute to international cooperation is problematic. A clear understanding of a country’s domestic decision-making structure is equally, if not more, important in drafting policies that can maximize the positive influence of epistemic community on nuclear arms control cooperation.

**References**


Zhao, Hong (赵宏). 2006. Track Two Dialogue between the U.S. and China on CTBT Negotiations (二轨外交与中美全面禁止核试验条约谈判), Institute of International Studies (国际问题研究所), Tsinghua University (清华大学), Beijing.

