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Research Note

Revisiting the Dazu "Bombard" and the World's Earliest Representation of a Gun

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Abstract

In 1988, Joseph Needham, Lu Gwei-Djen, and Pan Jixing published an article that declared to the world the discovery of the earliest known representation of a bombard, or gun. In the academic literature, however, there is significant doubt about its authenticity as a representation of a gun. Little subsequent evidence beyond the 1988 research note has corroborated their initial findings. This research note will show that the evidence originally presented by Lu, Needham, and Pan to support their argument that the cave in Dazu contains a bombard is inadequate. In doing so, it highlights the challenges researchers of Chinese history and the history of science have faced in the past and suggests ways the field is growing.

Keywords

first gun – Needham – history of science – bombard – baodingshan

In 1988, Joseph Needham, Lu Gwei-Djen, and Pan Jixing published an article that declared to the world the discovery of the earliest known representation of a bombard, or gun. Their research has been cited in both academic and

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FIGURE 1
Spirit or demon image reproduced from Lu et al. 1988
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popular histories as clear evidence of China's early strides in gun technology. In the academic literature, however, there is significant doubt about its authenticity as a representation of a gun, and little subsequent evidence beyond the 1988 research note has been found to confirm the initial claims.

The representation itself is a high-relief sculpture in cave niche 149 of the Dazu grottos in the Baodingshan mountain range, located some 250 kilometers northwest of Chongqing. In their published research note, Lu, Needham, and Pan describe the sculpture as a small demon having two horns and holding a bombard (Fig. 1) and remark that situated directly opposite is a demon holding a bomb.[1] In both handwritten notes from Lu Gwei-Djen and Joseph Needham's visit to the cave in 1986 and subsequent commentaries, such as Liu Xu's 2004 history of ancient gunpowder weapons and Stephen Haw's 2013 discussion of early gunpowder's proliferation, the "bombard"-wielding demon as well as its "grenade"-holding counterpart are readily admitted to be a wind spirit, *fengshen* 风神, and a thunder spirit, *leishen* 雷神, respectively.[2] Newspaper articles in the history column of the *London Sunday Times* and *Sri Lanka Daily Times* thrust this cave and its contents from relative obscurity into the spotlight of the gunpowder narrative, as this evidence was added to *The Gunpowder Epic* (vol. 5, part 7 of *Science and Civilisation in China*, which is hereafter abbreviated as *SCC*).[3]

Thus, the Dazu carving has become an important piece of evidence for proponents of an early invention date for guns. But as more English-language scholarship on the Dazu cliff carvings has become available, the cave and the figurine in question require review in order to assess whether they should continue to be included in the gunpowder narrative. This research note will show

1 Lu 1988, 594. See Figure 6, below.

2 Needham and Lu 1986 (Needham/NRI2/SCC2/152/1/10); Lu et al. 1998, 596; Cheng 1992 161-65; Liu 2004, 27-29, Haw 2013, 541; Sinvany 2019.

3 The *London Sunday Times* article (Temple 1987) is titled, "Bang goes a gunnery date"; the *Sri Lanka Daily Times* article is titled "Scholar-sleuth in the trail of the first hand-gun" (Needham/NRI2/SCC2/152/1/4).

that the evidence originally presented by Lu, Needham, and Pan to support their argument that the cave in Dazu contains a bombard is inadequate. This note suggests that a combination of Needham's view of the history of science as ecumenical—a series of local traditions and scientific achievements that feeds into "a single history and a single, ever growing structure"[4]—and the particular circumstances in the field of sinology and history of science at the time of writing played key roles in transforming Buddhist iconography into an element of Needham's "ecumenical" history of the gun.

The evidence presented in the initial 1988 research note are reflective of this type of ecumenical science, that, while noble in intention, has a tendency to fold local traditions into a universal narrative of scientific development. Needham and his fellow researchers relied heavily on a fourteenth-century European manuscript's representation of a bombard, similar in shape to the Dazu sculpture, to support their claim. The presence of roughly forty *tianshenxiang* 天神像, or celestial figures, in the cave, some of which are holding weapons, served to confirm their suspicions that the cave's wind spirit was holding a bombard. Additionally, the significance of the year the cave was completed (A.D. 1128), the military affiliation of the cave's sponsors, and the cave inscription's call for peace all led Lu, Needham, and Pan to infer that two figures in the cave held gunpowder weapons. With a lack of corroborating evidence or recognition by significant studies of the Dazu Cliff carvings, these initial claims that the Dazu "bombard" is in fact a gunpowder weapon must be reassessed. The question remains, however, what allowed this group of expert researchers and leaders in their respective fields to make such an attribution?

Working backwards, we see that the Dazu carving fits neatly into the theory that Needham and his team were proponents of—that the gun had been invented long before it reached Europe. This intent was made clear in the conclusion of the research note:

> [T]he Ta-tsu bombard demonstrates ... the length of time between its invention and its transmission to Europe. It has always seemed rather strange that only thirty-nine years elapsed between the oldest metal-barrel bombard or handgun known in China and its transmission to the Western world. But now the space of time is more like 199 years—a much more reasonable period as these things went in the Middle Ages.[5]

4 Low 1998, 1.

5 Lu et al. 1988, 605.

The Dazu relief was the smoking gun that Needham required to prove his assumptions that the invention of the gun in China predated its arrival in Europe by almost two centuries. The final footnote in the research note references Egyptologist Robert Temple's newspaper article in the *London Sunday Times* lauding the discovery. Temple was a colleague of Joseph Needham and together they had published the book *The Genius of China: 3,000 Years of Science, Discovery, and Invention* in 1986.[6]

Thomas Mougey observes that much of Needham's early work was focused on strengthening the historiographical value of studying Chinese science as well as establishing his own credibility as a historian of China. He did this in a number of publications outside of the scope of his *Science and Civilisation in China* project, such as *The Grand Titration* published in 1969.[7] By 1986, Needham had long since confirmed his credibility as a historian of science, and in fact had helped to define much of how scholars now view the field. In this connection, his work with Temple can be seen as an extension of popularizing the study of Chinese history. The value of the discovery of the first iconographic evidence of a bombard lay in its ability to add credibility to his already robust theories about gunpowder's development. These theories are well documented in *The Gunpowder Epic* and won't be discussed here, but it is important to note that while Needham's 1988 claims about the Dazu caves are called into question, most recent historical studies have proven his theories largely correct—gunpowder technology and gunpowder weapons did undergo centuries of incubation and development in East Asia before making their way to Europe. Needham's research note served to bolster his argument that the true gun had been invented two centuries prior to its transmission to Europe. This early of a date for a true gun is most likely not true.[8]

The use of language in Temple's argument is important to examine. He writes, "[Needham] noticed that a stone carving representing a mythical army surrounding a statue of Buddha included a soldier carrying what Needham *knew* as a depiction of an early form of gun."[9] The earliest extant guns, to date, known in China (A.D. 1288) do not resemble the object held by the Dazu figurine. As Lu, Needham, and Pan note, they are not as bulbous in shape and possessed a socket on the rear to mount a wooden shaft, or "tiller," in order to

6 Temple 1986.

7 Needham 1969.

8 See Sinvany 2019 for a more in-depth discussion on why a true gun is not likely to have existed in China prior to the thirteenth century.

9 Temple 1987. Emphasis added.

grip, yet neither socket nor tiller is present in the sculpture.[10] The notion that Needham *knew* what he was looking for is a key indicator that the discovery at the Dazu bombard should be revisited.

Imagining, for a moment, what Needham knew about the earliest guns before he went to the cave in Sichuan leads us to a bombard depicted in the Walter de Milameté manuscript. Found in a Bodleian Library manuscript dated to A.D. 1327, the painting depicts a gunpowder weapon being ignited by a knight in a full suit of armor. In the same manuscript there is a second representation of a bombard being set alight by a single knight surrounded by three attendant knights. Both share a similar bulbous shape to that of the sculpture at Dazu, and it is clear that these images informed Lu, Needham, and Pan's understanding of what an early gun looked like—thus leading them to their conclusions about the relief sculpture found in cave 149.[11]

The authors' conclusions leave hints of doubt, like a trail of crumbs, throughout the note that bear revisiting. For instance, despite noting the unorthodox method by which the "bombard" was being held, Lu, Needham, and Pan write:

> Of course, the high-relief sculpture cannot have been done by anyone who knew anything about bombards or handguns, because the explosion chamber would have been much too hot to hold, and usually there was a socket cast on behind it, into which a wooden "tiller" was fitted for grasping.[12]

Rather than questioning the unrealistic way in which the relief figure is holding the cannon, they dismiss this as ignorance on the part of the craftsperson of the proper workings of a gun. Stephen Haw echoes this mode of thinking by attributing even more agency to the carver. He suggests that because the relief figure is a supernatural being it "might well have been supposed to have the power to hold and fire the cannon."[13] The way in which an early gun is fired would make holding one as the figure does an impractical and dangerous pursuit. As can be seen in the Milameté manuscript, early guns were likely mounted on trestles and fired.

Liu Xu cites the fire lances prepared by Chen Gui to defend De'an during the siege of A.D. 1132 as evidence to discount the Dazu relief's probability of being

10 This latter point may not be relevant, however, as Lu et al. point out that the Walter de Milemeté bombard is not depicted with a socket or tiller either.

11 For these images from the Walter de Milemeté manuscript, see Lu et al. 1988, pages 601 and 602.

12 Lu et al. 1988, 597.

13 Haw 2013, 541.

FIGURE 2
Wind spirit at Baodingshan

a gun. He claims that gunpowder weapons contemporary with the carving of the Dazu cave required at least two men to prevent the weapon from flying backward under its own force.[14] Liu notes that the relaxed way the figurine "casually held up" the bulbous object, "in the palm of one hand," is further proof that it is a wind spirit.[15] If the figure's supernatural form is believed, then the physics of a gun may not apply, but that raises questions of why there was a gun appearing in the mountains of Sichuan in the early twelfth century. Needham suggests that the technology of the bombard, like the one depicted at Dazu, was "kept a state secret in the arsenals of the Southern Song."[16]

Scholar Cheng Dong presents an alternative theory, and the more likely explanation that the relief in question is depicting a form of a wind spirit, of which much grander stylings are present elsewhere in the Dazu cave system.[17] Angela Howard's 2001 work *Summit of Treasures* includes the description of a 7-meter-tall relief in the Baodingshan mountain range that depicts mist, rain, lightning, thunder, and wind spirits. The wind spirit itself (Fig. 2) is at least two or three meters in height, has two horns, and is holding an inflated bag of winds.[18] While there are no lines streaming from the bag's mouth, the bag is clearly expelling winds that are disturbing the robes of the bearer, similar to the streams of air that are being expelled from the mouth of the bag in cave 149. The larger wind spirit is holding the bag in a similarly casual manner as if wielding it.

Thomas Suchan identifies that the central bodhisattva relief in cave 149 describes "the creation of a mandala with two courts … the outer court

14 Liu 2004, 29; The use of the fire lance at the siege of De'an is discussed in detail in Andrade 2015, 35-37.
15 Liu 2004, 29.
16 Lu et al. 1988, 603.
17 Chen 1992, 161-65.
18 Howard 2001, 27-29.

describes … fire, water, and wind gods."[19] Here, Suchan's observation that of the forty-odd *tianshenxiang* present in cave niche 149 many are "stereotyped and lack specific individual iconographic traits" is particularly salient.[20] Though uncommon for Chinese Buddhist sculpture, this correlation leads Suchan to believe that the figures in the cave are a simplified version of a more complex mandala, further suggesting that the Dazu bombard is a simplified bag of winds. This mandala is found in cave niche 9, and among the retinue of a 1,000-arm Avalokitesvara (Guanyin) figure a spirit holding a bag of winds can also be found in small relief in the rear of the cave.[21] In the Anyue grottos, near Dazu's Baodingshan, the Piludong 毗卢洞 grotto contains a sculpture that, while slightly damaged, depicts a wind spirit seeming to brandish a bag of winds.[22]

It was not just the bulbous nature of the bag of winds that suggested to Needham that there was some connection between the gunpowder narrative and this cave.[23] An administrator of prefectural military affairs, Ren Zongyi 任宗易, sponsored the cave. Though the final line of the inscription is partially illegible, the legible portion reads:

> 方瞻仰祁乞 [illegible] 干戈永息建炎二年四月
>
> With reverence we request that [illegible] weapons of war forever rest. Fourth month of the second year of the *Jianyan* era (A.D. 1128).[24]

This inscription confirms that the cave was completed at least by the year 1128 A.D. and that the military man Ren Zongyi was interested in ending war. It is important to note that in the previous year, the capital of the Northern Song, Kaifeng, had been sacked by invading Jurchen forces and the Song emperor captured and transported north into Jurchen territory. In this moment of turmoil and weakness in the Song realm, it becomes plausible that a military administrator would beseech the heavens for peace. Here, Lu, Needham, and Pan pose a question: "What [was] the object of having the thirty-seven personages to the right and left on the walls of the cave carry weapons?"[25]

19 Suchan 2003, 278.

20 Suchan, 730.

21 Suchan, 231-44, especially 239.

22 Personal correspondence with Tom Suchan.

23 A more detailed description of the cave's contents can be found in Suchan 2003, 274-79 and 728-30.

24 This inscription along with others found in cave niche 149 can be found in Suchan 2003, 840.

25 Lu et al. 1988, 600.

FIGURE 3
Guanyin bodhisattvas and donor statues

For Needham, the date (A.D. 1128) of the cave, and the presence of other weapons in the cave, were vital pieces of evidence to support his claim of early gunpowder weapons. Yet, the question of why so many weapons persisted for him. The research note suggests two answers. The first is that the weapons were meant to represent the many forms of weaponry that the founders prayed would be forever put to rest. Alternatively, it is possible "that all these were spirit guards defending the goddess Kuan-Yin."[26] However, the note is very quick to dismiss this second explanation as being the less likely of the two.

Among the figurines in the cave, it is clear that a number of them are carrying weapons of different kinds. In addition to the Guanyin bodhisattvas and the donor statues present on the rear wall of the cave (Fig. 3), there are roughly forty figures present in the cave situated in six rows, three running along each side wall (Figs. 4, 5). Clouds provide the background for each row, which is where the term 天神像, or heavenly figure, is derived in reference to these figures. Among these personages, many are in fact bearing weapons, but this fact alone does not necessarily mean that the cave holds evidence of gunpowder weapons.

The dismissal of the second explanation seems self-serving for Needham's argument, rather than an analytical assessment of the contents of the cave. As studies of the cave have shown, sculptures present in the cave are typical of the types of canonical Buddhist and local iconography found in other caves in Baodingshan.[27] Furthermore, Needham's reading of the spirit as a gunpowder-wielding demon contradicts in some ways the understanding of the cave as a prayer for peace in a time of turmoil during the Song.

Other scholars have used similar logic as Lu, Needham, and Pan, to support the claim that there is a bombard in the cave niche. Haw readily admits that

26 Lu et al. 1988, 600.

27 Suchan 2003, 274-79 and 728-30.

FIGURE 4 Side wall figures (left)

FIGURE 5 Side wall figures (right)

the figure in question is a wind spirit (*feng shen* 风神) holding a bag of winds (*feng dai* 风袋), but he goes on to say that because other figures in the cave are holding weapons it can be assumed that the *feng dai* is also a weapon, and not simply a bag of winds.

Contemporary studies of cave 149, notably the 1985 publication of the *General Catalogue of the Stone-Carvings of the Ta-tsu Cave Temples*, as well as more recent studies, do not associate it with the gunpowder narrative.[28] Those that do reference the cave and the relief in question refer to the figure as a "wind god."[29] That the carving in question resembles a bombard or a gunpowder weapon at all can be entirely attributed to Lu, Needham, and Pan's claims put forth in their 1988 research note.[30]

Lu Gwei-Djen is noted to have observed that "the parallel figure on the left of the lowest rank, directly opposite the bearer of the bombard, is a figure holding a bomb in his right hand."[31] In Suchan's study of the cave, however, he describes the same sculpture (Fig. 6) as "a dwarfish figure who holds a round object which is spewing out a stream of light or mist."[32] A similar object is being held by a bodhisattva in cave niche 136. Suchan describes the object as "a round jewel....[e]mitting a long twirling stylized ribbon of light or smoke

28 See Li 1985, 65-66; Wang 2000, 92; Suchan 2003, 278-79 and 730.

29 Suchan 2003, 730.

30 A quick review of citations of Lu et al. 1988 shows very few citations by other military historians, and more common use in popular histories such as Morris 2014.

31 Lu et al. 1988, 596.

32 Suchan 2003, 730.

FIGURE 6
"Dwarfish figure" holding "round object," reproduced from Lu et al. 1988
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that rises to the top of the niche."[33] Rather than a bomb, the figure could be holding a flaming variation of a cintamani pearl, or wish granting jewel, a common Chinese Buddhist motif. Thus, Lu's observation of a "bomb" in cave niche 149 must be called into question. An art historian familiar with the grottos suggests that the object is more likely an incense burner than a gunpowder weapon.

Finally, the claims that there are flames and even a cannonball being shot forth from the "bombard" can also be overturned. What Needham and Haw view, with considerable certainty, as a cannonball is dismissed by Liu, who describes a conversation with a colleague at the Dazu Cultural Artifacts Conservation Bureau in Sichuan in which the colleague states any cannonball that is present in the sculpture was added on later.[34] A close inspection of the photograph presented in Lu, Needham, and Pan's original note (Fig. 7) shows that the lines of the purported flame, in fact, run through the "cannonball." This is clear evidence that, even if this were carved contemporaneously with the rest of the grotto, there is no cannonball, as a ball would be distinct from any flames or force expelling it forward. It may simply be an anomaly, or the remnant of a later addition that has since been vandalized or removed.

There are historiographical reasons why Lu, Needham, and Pan would have misattributed the Dazu sculpture as an early gun, but there is another explanation I would like to suggest that may be found in a psychological phenomenon known as *inattentional blindness*. IB, as it is referred to in the scientific literature, holds that "when one is engaged in a demanding task, attention

33 Suchan 2003, 720.
34 Liu 2004, 29.

FIGURE 7
The purported "cannonball," reproduced from Lu et al. 1988
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can act like a set of blinders"; a person may not recognize relevant information if they are engaged in a different task.[35] In some ways, this is precisely what Needham and his team of researchers fell victim to. Because they were laser-focused on proving the existence of bombards in twelfth-century China, they failed to accurately assess the surrounding environment in which the cave was found. Based on this initial incorrect assumption, Lu, Needham, and Pan were able to find contingent evidence that adequately explained their initial assumptions but did not absolutely prove the existence of a bombard at Dazu. The lack of corroborating studies in the decades since and the contentions raised by notable Chinese scholars continue to call the original claim into question.

Considering the keystone nature of the relief in cave niche 149 for Needham's theories of the early presence of guns in East Asia, the misidentification becomes more plausible. Identifying this mistake, we must revise Stephen Haw's claim that "this sculpture is significant evidence of the early existence of cannon."[36] This note shows, instead, that there is no iconographic representation of a gun in cave niche 149, and argues that instead there is a sculpture of a local religious spirit holding a bag of winds. The desire of Needham and his colleagues to find evidence for an earlier date for gun innovation in Asia colored their perception of the sculptures found in cave niche 149. This intent empowered the researchers to dismiss initial suggestions by local knowledge holders that the demons at the mouth of the cave were wind spirits (*fengshen* 风神).[37]

35 Trafton et al. 2013, 1848.
36 Haw 2013, 451.
37 Lu et al. 1988, 596; Liu 2004, 27-28.

Conclusion

> There are almost no outsiders in this still small field ... and it is hard for those inside the enterprise to look at it with an outsider's objectivity.
>
> MARK ELVIN 1980, 19

To conclude, it is appropriate to return for a moment to Needham's legacy and its impact on researchers of China and East Asia. Needham's work itself has influenced and inspired generations of scholars, which makes any revision or critical view of Needham's work uniquely challenging. This is not because Needham is infallible, nor that the claims in *SCC* can't be critically engaged, whether to test, to overturn, or to revise. Rather, it is the environment in which Needham's work exists that may inhibit critical self-examination. Mougey's specific claim is that in the past those qualified to critically analyze Needham's work were either students or collaborators of his and thus were likely to revise his work in a less than impartial manner.[38] To highlight his point, Mougey cites Mark Elvin's poignant observation made in an article in *Past and Present* in 1980:

> There is a special difficulty in evaluating Needham's work, which must be faced honestly. Almost every living scholar who is qualified in science and sinology has been drawn, for entirely proper and praiseworthy reasons, into the web of collaborative endeavour that surrounds *Science and Civilisation in China*. There are almost no outsiders in this still small field who could be insiders, and it is hard for those inside the enterprise to look at it with an outsider's objectivity.[39]

Thomas Mougey muses that it is notoriously difficult to objectively assess the assumptions and biases of *SCC* and its peripheral projects. The tendency of *SCC* to draw scholars of China and the history of science in East Asia into its orbit can make objective review of the contents difficult. Therefore, researchers who reside in projects that span disciplines, such as *SCC*, run the risk of misidentifying evidence or misrepresenting the artifacts they examine.

Today, as the final volumes of the *SCC* project are published, the number of scholars and experts in all disciplines publishing works in Chinese, English, and other languages about China's history of science has increased. The abundance

38 Mougey 2017, 84.

39 Elvin 1980, 19-20.

of sources and a positive environment of academic exchange, including collegial support, freedom to publish, and free access to published works, allows for scholars to engage the work of Needham and his cohort with a critical eye grounded in a multi-discipline approach. As this new generation of researchers grows, scholars will be able to continue to critically analyze particular assumptions of the *SCC* project, confirming elements that are still correct, and revising pieces where new evidence has come to light. In doing this, we can build a more robust and nuanced understanding of the history of science in China and the world.

These are the key issues related to the idea of the Dazu "bombard," and this note hopefully demonstrates convincingly that the sculpture in cave niche 149 is more likely wielding a bag of winds than a bombard. The revision of this particular piece of evidence in the gunpowder narrative does *not* overturn Needham's theory that two to three centuries prior to gunpowder's diffusion to Europe it was undergoing a significant and sustained period of innovation and development in East Asia.[40] With a critical eye grounded in an interdisciplinary approach, however, we can better understand how professional or personal biases may inform our own assumptions as researchers. By confronting strongly held and often difficult to identify assumptions, we can craft better questions, approach evidence from different angles, and as historians give the subjects of our gaze the agency to engage in dialogue with the frameworks of the historical narratives we construct.

Abbreviations

SCC *Science and Civilisation in China*
DSDS *Dazu shike diaosu quanji* 大足石刻雕塑全集

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40 There is ample evidence that supports this claim. See Needham 1986, Lorge 2008, Haw 2013, Andrade 2016, and Sinvany 2019 for more details.

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