

British Scientist Who Helps Sort Out Trash

Dialogue

By Staff Reporters

At the North Village canteen at Fudan University in Shanghai, you might spot a British professor tucking into her favorite dish: Fudan's famous braised pork. That's Marie Harder, who has spent 15 years in Shanghai studying "garbage."

Last year, she received China's highest honor for foreign experts, the Chinese Government Friendship Award.

Long before Shanghai's waste sorting regulations made headlines, Harder and her students were already embedded in the city's residential communities, tracking how people shifted from reluctance to routine.

Decade of grassroots research
Fudan University's Sustainable Behavior Research Group, one of the earliest university research teams in China to focus on waste sorting, conducted a decade-long study on how urban residents develop the willingness to sort waste, begin doing it, and sustain the habit.

"At first, even the students didn't know much. In fact, we were building a theory. These theories needed to start with small experiments, moving from residential compounds to subdistricts, and then expanding to the entire city of Shanghai. Ultimately, we identified the most important behavioral factors for waste sorting in Shanghai," Harder explained.

Before Shanghai entered its "mandatory waste sorting era," Harder and her team submitted a report to the municipal government, highlighting three key findings: the adequacy and rationality of facilities and equipment, residents' understanding of their role in waste sorting, and a friendly volunteer-based duty system for interpersonal guidance at waste stations.

In February 2019, Shanghai's *Municipal Regulations on Domestic Waste Man-*



Professor Marie Harder. (PHOTO: Fudan University)

agement were released. Harder told reporters the effects were quickly evident after the regulations took effect. The regulations promote waste sorting through legal enforcement, clarifying the responsibilities of all parties, mandating source reduction, and ensuring full-chain supervision of the sorting system. According to assessments and research conducted two years later, Shanghai's waste sorting efforts have proven successful.

In 2011, Harder moved her family from the UK to Shanghai, where she and her students delved into Shanghai's grassroots communities. They visited 25,000 residential compounds across Shanghai for field research. Donning masks and gloves, they inspected waste sorting stations and communicated face-to-face with community residents, studying how people move from willingness to action, and finally to habit. These fieldwork findings were compiled into policy advisory reports on domestic waste management, which contributed to the 2019 *Municipal Regulations on Domestic Waste Management*.

One of Harder's students, Li Chang-

jun, now an associate professor at Nanjing Agricultural University, continues to research waste sorting management. "Working with Professor Harder on the ground gave me great inspiration and solidified my decision to continue this research, which is of great significance to the sustainable development of humanity," Li said.

"I have realized my original aspiration to contribute to the development of all humanity. Conducting research on sustainable development in Shanghai has made me resonate deeply with the spirit of this city," Harder said emotionally in 2021, when she received the Magnolia Gold Award, Shanghai's highest honor for expatriates.

Pioneering the 'WeValue' methodology

Harder's research on the "behavioral factors for waste sorting in Shanghai" is part of her broader commitment to studying "sustainable behavior" since 2010. She realized that changing people's behaviors to make them sustainable and facilitating knowledge exchange among different communities are crucial for enhancing

public participation in community development and advancing sustainable development.

Harder thinks many phenomena remain unexplained by existing scientific theories; relying solely on known scientific knowledge to guide human development is too limiting. The "sustainable behaviors" of different groups and the underlying values and preferences embody important local wisdom.

"Many communities do not realize that the practices they have passed down for centuries on their land, though not yet explainable by current science, are beneficial to the sustainable development of all humanity," Harder said. A significant part of her team's work involves articulating this wisdom, which has often been overlooked or is difficult to express due to lack of trust or cognitive differences.

"We have spent over a decade developing and refining a methodology called WeValue," Harder said. This methodology systematically extracts "shared values" from people's sustainable behaviors, identifying external factors that influence human health, development, or behavioral change, thereby increasing public engagement with and acceptance of policies.

Throughout their fieldwork, Harder's team respects local values, acting as listeners and translators. This approach aligns closely with the Global Civilization Initiative, which holds that "all peoples have the right to pursue and explore the realization of common values for humanity."

From a philosophical and ethical perspective, Harder's work focuses on empathy and shared understanding among different subjects — a concept that resonates with the principle of "people-to-people connectivity" in the high-quality development of the Belt and Road Initiative.

This article was edited and translated based on the Chinese version written by Fudan University.

Tech+Culture

Beijing Leads Charge in Digital Cultural Innovation

By Staff Reporters

Beijing, a city that has evolved over 3,000 years, is also the nation's cultural hub and a center for international exchange. Its flourishing historical and cultural resources provide an integral and essential component of cultural development in the digital age.

From physical presence to digital perception

To learn about urban culture, you need to experience it firsthand. Technologies such as virtual reality (VR), augmented reality (AR), and high-precision 3D modeling, now allow people living thousands of miles away to immerse themselves in Beijing's historical settings in a truly "on-site" manner.

For example, the ongoing project to digitally preserve and disseminate Beijing's Central Axis is transforming the route's key architectural landmarks into accessible digital assets. By creating navigable, immersive, experiential spaces and making them available to the public via multilingual platforms, the project enables visitors to "walk through" the Central Axis in a digital realm, and observe the evolving urban landscapes of Beijing across different historical periods.

From unidirectional output to bidirectional dialogue

Traditional communication models often overlook audience feedback and needs through their unidirectional "I speak, you listen" model. This is particularly problematic when engaging diverse cultural audiences because the lack of interactivity often leads to misinterpretations and can reduce the effectiveness of cultural exchange. Digital technology's inherent interactivity offers a solution by enabling two-way cultural communication.

Cultural and museum institutions in Beijing are actively improving their digital practices to address this issue. While serving local audiences, these institutions are cultivating new, more

vibrant scenarios for international cultural exchange. For example, the Capital Museum's interactive guided tour platform supports multilingual switching and personalized content customization. This ensures that visitors from different cultural backgrounds can engage in a way that suits their cognitive habits and cultural sensibilities.

From grand narratives to micro-perspectives

For a long time, cultural communication in Beijing focused on "grand narratives," such as the city's millennia-old history and magnificent civilization. However, these narratives don't mean much to people lacking the necessary historical context. Digital technology makes cultural themes more universally accessible and relatable through strategically re-contextualizing content.

For example, the lion motif has widespread symbolic meaning representing guardianship and protection, making it a universally understood entry point into cultural appreciation. Beijing's Fengtai district used 3D printing technology to transform the stone lions of the Lugou Bridge into cultural and creative products. These items became a focal point of interest among international journalists and diplomats at the 2026 Spring Festival Reception for Foreign Correspondents.

The video series *Hello, Beijing: A Diplomat's Notes on the Capital* features a wide group of foreign diplomats in China. By translating their impressions of the city into personal narratives and sharing them via digital platforms, the series allows the "Beijing Story" to connect with diverse audiences in a more approachable and engaging manner.

This threefold transformation aims at a single objective: ensuring that cultural communication returns to its human-centric roots. By deeply integrating cultural and technological resources, Beijing enables its stories to reach a wider audience, while still upholding tradition and embracing innovation.

Cloud-and-Dragon Staircase Stone Alive with Artistry

Traditional Eastern Wisdom

By BI Weizi

The Cloud-and-Dragon Staircase Stone stands as a quintessential example of ancient craftsmanship, located proudly behind the Hall of Preserving Harmony (Baohedian) in Beijing's iconic Forbidden City.

Sourced from Dashiwo village in the Fangshan district on the outskirts of Beijing, the structure is carved from four blocks of Aiyeqing, a green stone dating back to the Ming Dynasty. The largest block measures approximately over 16 meters long, 3.07 meters wide, and 1.7

meters thick. It weighs over 200 tonnes and is the largest structural component in the Forbidden City. The wisdom behind this monumental work is best demonstrated in the techniques used for its transportation and carving.

To transport the stone, craftsmen combined natural winter conditions with fundamental physics principles to complete an about 70-km haul. According to the historical record *Notes on the Construction of the Two Palaces (Liangong Dingjian Ji)*, the process was executed in three stages.

First, they constructed "dry boats" or rectangular wooden frameworks designed to carry the stone. The bases of these frames were made of wooden beams that created broad surface areas

to evenly distribute the immense weight of the stones and prevented their damage. Second, wells were dug along the route at intervals of about two km. In winter, water was hauled from these wells and splashed onto the road surface to create a sheet of ice, significantly reducing sliding friction. Third was the towing process. Teams of horses dragged the "dry boats" across the ice, advancing about eight to 10 km a day.

In terms of carving technique, the Cloud-and-Dragon Staircase Stone combines various craftsmanship styles that are in perfect harmony with each other. The soaring dragons are carved in high relief. By carving away the background material, the dragon motifs stand out in bold relief, creating a powerful three-dimen-

sional effect that makes the nine dragons appear remarkably lifelike. Conversely, the auspicious clouds and waves of Treasure Mountain are rendered in low relief. Only the areas immediately surrounding the motifs are incised, creating a subtle effect that contrasts with the dynamic dragons. Moreover, the scrolling vine patterns on either side of the stone are rendered in flat relief, conveying a sense of fluid movement and vitality.

The monumental carving embodies the spirit of ancient craftsmanship — a spirit that balances adherence to established aesthetic norms with innovative, era-specific techniques. As such, it serves as an invaluable reference for preserving and sharing intangible cultural heritage skills.



Tourists visit the "Digital Art Exhibition on the Central Axis" at the "Shanmen Laiba" Digital Art Museum in Beijing. (PHOTO: VCG)

What Makes Cerium-Magnesium Changesite Unique?

Science Outreach

By HU Lijuan & BI Weizi

May 3, 2026 marked two years since the Chang'e-6 lunar "soil-sampling" mission began. A milestone in this mission is the International Mineralogical Association approving Cerium-Magnesium Changesite as the 11th newly discovered lunar mineral after Chinese scientists identified it from a lunar meteorite. This discovery provides crucial mineralogical evidence

for understanding the Moon's origin and evolution.

Cerium-Magnesium Changesite was discovered in the first lunar meteorite to fall within China's territory — the Pakepake 005 meteorite. Li Minjing, an associate professor at the School of Environmental Science at China University of Geosciences (Wuhan), said the spherical meteorite weighs 44 grams and is covered with a dark fusion crust, revealing white and dark fragments of calcium feldspar.

Many people confuse Cerium-Magnesium Changesite with Changesite discovered in 2022. Although the two are "siblings" within the "phospho-calc-soda group," there are significant differ-

ences between them.

Li explained that Changesite, derived from the samples brought by China's Chang'e-5 lunar mission from the moon, was discovered in 2022. It is rich in the heavy rare earth element yttrium. Its space group (the set of all symmetry elements within the crystal's internal structure) is R3c, and the c-axis length of its unit cell (the most basic geometric unit constituting the crystal) is approximately 37.2 Å, which are typical mineral characteristics.

In contrast, Cerium-Magnesium Changesite — discovered in 2024 and officially named in 2026 — originates from a lunar meteorite. It is rich in the light rare earth elements cerium

and magnesium, with a space group of R3m.

The discovery of Cerium-Magnesium Changesite provides new mineralogical evidence for understanding the crystallization and differentiation mechanisms of the lunar magma ocean, expanding the boundaries of our knowledge of the material world.

Li said due to its unique crystal structure and chemical composition Cerium-Magnesium Changesite can serve as a sample for studying the composition of lunar materials, while its inherent luminescent properties can provide insights for research on new luminescent materials.

Furthermore, its rare earth element ratios and crystal structure characteristics can be a reference for the artificial synthesis of related minerals.

China's Icebreaker Xuelong 2 Bolsters Sci-tech Exchanges

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Shramik Maruti Patil, a scientist from the National Centre for Polar and Ocean Research of India, was impressed by the well-prepared Chinese researchers who assisted international participants with sampling and analysis.

Patil praised the open platform established by China, saying it is conducive for scientists from different fields to jointly solve the major scientific problems identified by the Scientific Committee on Antarctic Research. He looks forward to participating in more joint projects, especially expeditions in specific fields such as physical oceanography and the cryosphere.

Benefiting polar governance

International exchanges are crucial

for sharing knowledge and deepening understanding of the unique Antarctic region, Dwyer said.

Understanding Antarctica is the foundation for protecting and utilizing it. The continent holds significant strategic importance for global ecological balance, climate regulation and sustainable utilization, said Chen Jianfang, deputy leader of the expedition and chief scientist of the joint voyage.

The joint voyage provided a platform for in-depth exchanges among researchers from various countries. It reflects China's efforts to build an open, inclusive and mutually beneficial polar scientific research environment, and to practice the concept of a community with a shared future for mankind, Chen added.