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# A critical cognitive analysis of Japan's nuclear contaminated water discharge discourse

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This research investigates the use of compound image schemas in the discourse surrounding Japan's nuclear wastewater discharge. By analyzing editorials from *Asahi Shimbun*, this study reveals how discourse producers, from government bodies to media outlets, employ image schemas to navigate, shape, and legitimize their stances on this contentious issue. The investigation identifies the prevalent use of PATH and CONTAINER schemas, facilitating the construction of complex narrative spaces that define "in-group" and "out-group" dynamics, thereby guiding public perception and discourse participation towards an implicit endorsement of specific policy directions. The findings highlight the dynamic interplay between micro-level discourse strategies and macro-level cognitive frameworks, projecting tailored narratives into the public sphere. This projection, rooted in sophisticated cognitive mechanisms, illustrates the strategic use of discourse to influence public opinion and legitimize environmental policy decisions, reflecting broader social implications and the power of discourse in shaping environmental risk perceptions.

## KEYWORDS

critical cognitive linguistics, nuclear contaminated water discharge, image schemas, discourse space, *Asahi Shimbun*

## 1 Introduction

Environmental risks, whether stemming from natural events or human actions, spread through various mediums and constitute a central category of risk. These risks provide a framework for understanding the complexities of the "risk society" (Juraite and Telesiene, 2009; Liu, 2016). Within this framework, discourse on environmental risk involves the strategic use of language, analytical frameworks, symbols, and rhetorical strategies. Participants in this discourse engage in a dynamic process of contesting meanings and maintaining discursive practices related to environmental challenges, thereby shaping public perception and understanding of environmental threats.

A notable example of such risk is the 9.0 magnitude earthquake that struck northeastern Japan on March 11, 2011, leading to nuclear reactor meltdowns at the Fukushima Daiichi Nuclear Power Plant (Chang and Zhao, 2012). This disaster resulted in the release of water contaminated with radioactive substances, posing a serious threat to marine life. Despite widespread international opposition, the Japanese government announced on April 13, 2021, its plan to treat and dilute this contaminated water for ocean discharge by spring 2023. This plan was implemented on August 24, 2023, marking the start of Japan's controversial release of radioactive water into the ocean. The legitimacy of this action has drawn significant attention from Japanese scientific communities, environmental advocacy groups, and the international community (Chang et al., 2022). The discursive practices in mainstream Japanese newspapers, particularly concerning the legitimization of environmental risk, require close examination.

Despite extensive research on environmental risks and their communication, there is limited exploration of how cognitive mechanisms and discursive strategies shape international governance responses to public perception and policy legitimation, particularly in the context of Japan's discharge of nuclear contaminated water (Chang et al., 2024). However, as Hart (2016) argues, while cognitive structures can be identified through discourse analysis, it is essential to empirically test how these structures influence readers' interpretations. Reception studies provide an empirical means to measure the real impact of these mechanisms on reader cognition. This study addresses this gap by analyzing the discourse surrounding the Fukushima nuclear-contaminated water discharge, focusing on how image schemas and discourse space theory are employed to shape public understanding and legitimize governmental actions.

The purpose of this study is to investigate the predominant image schemas in environmental risk discourse and their roles in metaphorical mapping. By adopting the perspective of critical cognitive linguistics, this research aims to uncover how discourse producers leverage these schemas and the dimensions of discourse space to legitimize their viewpoints, ultimately seeking to persuade their audience. Through this analysis, the study contributes to a deeper understanding of the mechanisms by which environmental risks are communicated and legitimized, offering valuable insights into the dynamics of environmental discourse.

The paper is structured as follows: Section 2 reviews the literature on environmental risk discourse and its impact on public perception. Section 3 outlines the research methodology, focusing on the data collection and analysis of discursive strategies related to the Fukushima nuclear contaminated water discharge. Section 4 presents the findings, highlighting how image schemas and discourse space theory shape public understanding and legitimize government actions. Finally, Section 5 discusses the broader implications of the findings for international governance and policy-making regarding environmental discourse.

## 2 Theoretical foundation

Critical Cognitive Linguistics (CCL) is an interdisciplinary field that combines Cognitive Linguistics and Critical Discourse Studies (CDS). Hart and Cap (2014) introduced a comprehensive classification and evaluation system within CDS, where research paradigms in CCL include Critical Metaphor Analysis, Cognitive Linguistics, Legitimation/Proximization models, and elements of Critical Cognitive Pragmatics and Corpus Linguistics. Despite their unique

features, these theoretical approaches universally recognize the cognitive role of discourse in activating and manipulating ideologies (Hart and Cap, 2014).

### 2.1 Image schemas

Image schema theory suggests that humans comprehend the world through embodied experiences, forming "images" that help grasp abstract concepts (Li, 2019). Image schemas are dynamic cognitive patterns rooted in human perceptual interactions and motor experiences, offering coherence and structure to our understanding of the world (Johnson, 1987; Hampe, 2005). In CCL, image schemas are crucial for examining how conceptual metaphors and metaphorical mappings shape human experiences and influence discourse.

Image schemas connect with other schemas for effective comprehension and interpretation of the world, demonstrating dynamic adaptability (Utsunomiya, 2002). This adaptability allows elements of basic image schemas to combine in broader contexts, creating compound image schemas (Besold et al., 2017). The inferential capability of metaphor networks lies in mentally simulating these schema elements' interactions. When different image schema metaphors converge, they form a compound image schema (Kimmel, 2005). Structurally, these compound schemas are composed of several basic image schemas, offering a comprehensive and three-dimensional portrayal of events. Basic image schemas can form complex compound schemas through processes like merging, collection, and structuring (Hedblom, 2020) (see Figure 1).

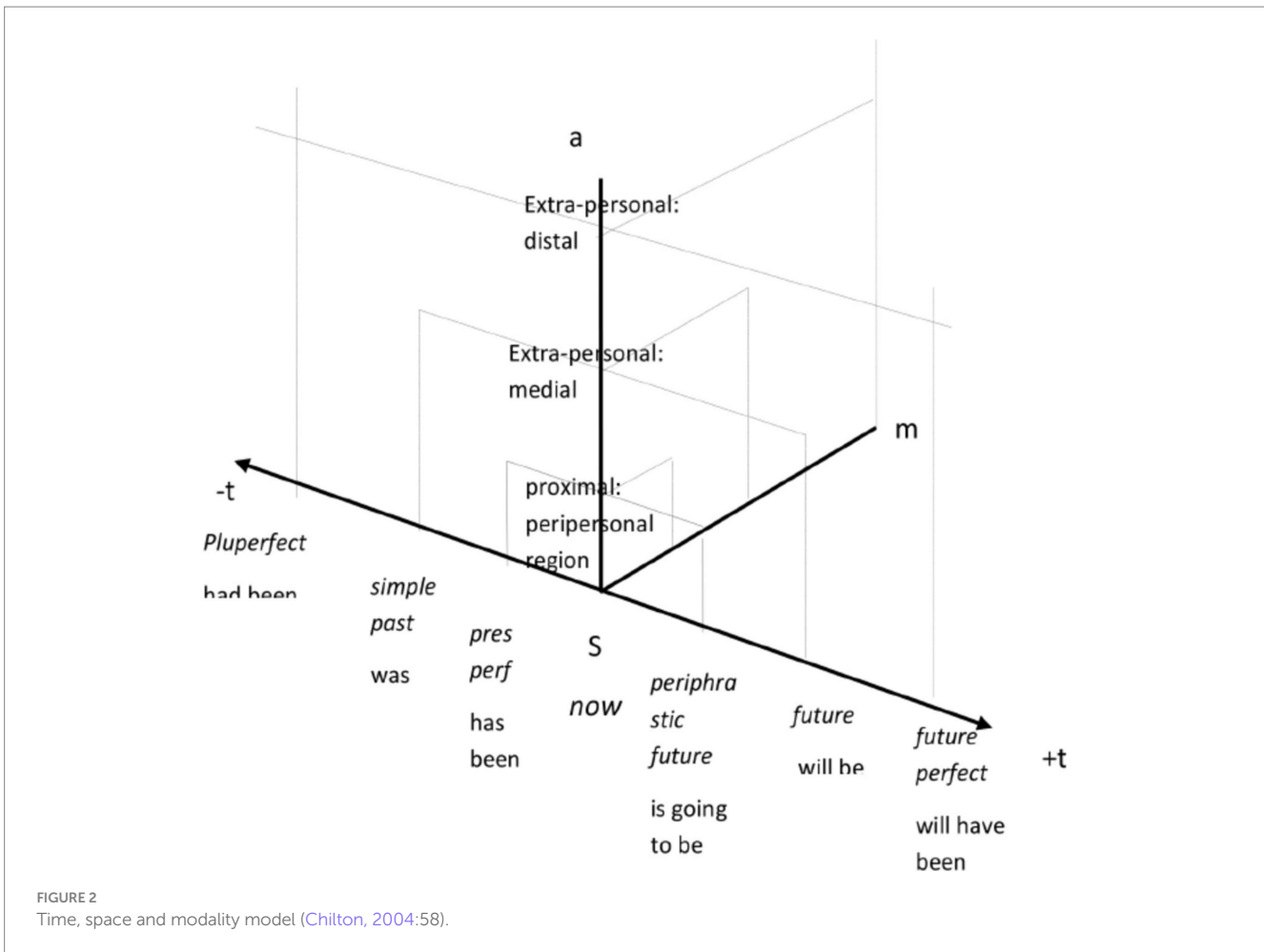
### 2.2 Discourse space theory

Discourse Space Theory (DST) originates from Chilton's (2004) concept of the Discourse World. Chilton posits that discourse constructs a "reality space" defined by discourse producers, encompassing various meanings from projections of "who, when, where did what to whom" (Chilton, 2004). Individuals can position themselves at the origin of this space, using dimensions of space, time, and modality to comprehend entities (see Figure 2).

DST offers a framework for abstracting the complex real world into a discourse space through spatial (a-axis), temporal (t-axis), and modality (m-axis) dimensions, allowing for the assessment of different entities' relative positions to the observer. Image Schema Theory and Discourse Space Theory provide powerful tools for decoding the cognitive process of understanding entities. Image schemas construct abstract concepts from basic perceptual



FIGURE 1  
Three types of image schema combinations (merge, collection, structured) (Hedblom, 2020:104).



experiences, while discourse space shows how these concepts evolve in communication.

Exploring DST, Holland (2018) emphasizes the integration of image schemas within discourse space theory, highlighting three critical functions:

- (1) As space builders, they create new scenes or settings in our minds where the story or information can take place.
- (2) As content movers, they drive the action by determining the direction and magnitude of how things move or change in the mental space we have created.
- (3) As attention pointers, they direct our focus to specific parts of the mental space, making us notice certain things more than others

Holland's work highlights how these functions enable discourse participants to assign coordinates to entities within the discourse space, integrating image schemas with the spatial, temporal, and evaluative dimensions of DST. This approach enhances our understanding of how discourse strategies can legitimize policy decisions through the dynamic interplay between cognitive and symbolic mechanisms.

Based on image schemas, discourse participants assign different coordinates to entities in the discourse space. The time axis (t-axis) can be divided into absolute and relative time. Absolute time is identified

through specific dates or events, such as “令和元年” (2019) or “東日本大震災のとき” (when the Great East Japan Earthquake happened). Relative time often has a metaphorical nature, conceptualizing time as spatial (Yue and Wang, 2011). For example, in Japanese, “年月を経る” (over the years) uses the verb “経る” (pass by) to activate the path schema, metaphorically conceptualizing time as a path.

The spatial axis (a-axis) can represent literal geographic space or metaphorical socio-psychological space. Geographical space is identified through nouns or demonstratives indicating location or direction, such as “日本” (Japan) or “ここ” (here). Metaphorical socio-psychological space is identified through the CONTAINER schema, viewing events or behaviors as containers with boundaries, distinguishing “self” from “others” and constructing distance in abstract socio-psychological space (Li, 2004). For example, “社会に納得できない人” (people who cannot be understood by society) uses “納得できない” (cannot be understood) to activate the container schema, constructing “society” as a container and excluding “people” from it, thus creating distance in socio-psychological space.

The evaluative axis (m-axis) reflects value judgments and orientations. Image schemas often convey positive or negative evaluations (Krzyszowski, 1993). For example, in the CENTER-PERIPHERY schema, “center” has a positive connotation, while “periphery” tends to be negative. Maintaining “balance” (BALANCE) is seen as preferable to losing balance (Chilton, 2004). The “value”

dimension is identified through image schemas displaying positive or negative meanings.

## 3 Study design

### 3.1 Research objectives

This study aims to critically analyze Japanese editorials related to the Fukushima nuclear contaminated water discharge incident, focusing on identifying dominant compound image schemas in environmental risk discourse and their roles in linking discourse space with ideological implications. It examines how discourse producers use image schemas and strategies to restructure discourse space to legitimize their nuclear contaminated water discharge proposals and persuade the audience.

The specific research questions include:

- (1) Which types of compound image schemas are identified in editorials concerning the Fukushima nuclear contaminated water discharge incident, and what roles do they serve?
- (2) How do Japan's mainstream newspapers use image schemas and discourse space to shape readers' understanding of environmental risks, thereby enabling the legitimization of nuclear contaminated water discharge propositions?
- (3) What is the cognitive framework of environmental risk discourse, and how do image schemas, discourse space, and other discourse strategies interact?

### 3.2 Data collection

Data for this research were extracted from the Japanese version of *Asahi Shimbun's* editorials. Established in 1879, *Asahi Shimbun* is widely recognized not only as one of Japan's three major national newspapers but also as a leading voice often critical of the Japanese government, particularly on issues related to environmental and social policies. Its editorial stance is typically more liberal and progressive compared to its counterparts. *Asahi Shimbun's* approach allows it to maintain a critical distance from government narratives, making it a valuable source for examining public discourse on contentious topics like the Fukushima Nuclear Contaminated Water discharge. By focusing on *Asahi Shimbun*, this study captures the critical and often oppositional framing of environmental risks, providing insights into how media can challenge government actions and influence public perception.

The selection of editorials was based on relevance to the topic of nuclear contaminated water discharge, using "treated water" as a keyword. Editorials were chosen specifically because they represent the formal stance and ideological opinion of the newspaper, serving as a direct reflection of the publication's voice and position on critical issues. Unlike news articles, which are expected to maintain neutrality, editorials are explicitly designed to persuade and influence readers by presenting a coherent argument on current events, often aligning with the newspaper's broader ideological orientation. In the context of this study, editorials provide a rich source of data for analyzing how media outlets construct and disseminate their positions on controversial topics, such as the Fukushima Nuclear Contaminated Water discharge, and how these positions may impact public discourse and

perception. The analysis period spanned from three days following the Japanese government's decision to process and discharge Fukushima's nuclear-contaminated water into the ocean on April 13, 2021, to April 15, and from three days after the actual commencement of the discharge on August 25, 2023, to August 27. All the entries listed in Table 1 are indeed editorials and not op-eds. Each of these entries reflects the editorial stance of *Asahi Shimbun* on the respective dates. The data were carefully verified to ensure that only official editorials were included in the analysis, providing an accurate representation of the newspaper's position on the nuclear contaminated water discharge issue. This yielded a total of 11 articles and 18,163 words. The selection was focused on ensuring that all articles were editorials and not op-eds, to maintain consistency in analysis. Although the focus of this study is on *Asahi Shimbun*, it is important to note the communicative context provided by Japan's other major newspapers. *Yomiuri Shimbun*, known for its conservative and pro-government stance, largely supported the government's decision to discharge the wastewater, framing it as a necessary and scientifically justified action that aligns with international safety standards. In contrast, *Mainichi Shimbun* adopted a more cautious tone, highlighting concerns about environmental impact and public health, often questioning the adequacy of government explanations and calling for greater transparency. These differing perspectives illustrate the polarized media landscape in Japan, where each outlet's coverage reflects distinct ideological leanings that influence public perception of the issue.

### 3.3 Analytic procedure

Basic image schemas within discourse can be identified and interpreted using both explicit and implicit linguistic indicators (Sugai, 2001; Tseng, 2007). This study draws upon existing research on Japanese image schemas and uses the qualitative analysis software NVivo 11 to identify and analyze explicit and implicit linguistic indicators within the nuclear-contaminated water discharge editorials, with clauses as the unit of analysis. Explicit linguistic indicators are those expressions with clear image directions, while implicit indicators are those expressions tied to human embodied cognition without explicit image directions.

Compound image schemas arise from the amalgamation of basic image schemas. The analytical procedure in this study entails, firstly, identifying basic image schemas in sentences based on specific linguistic expressions at the clause level. Subsequently, by considering the context, semantic relationships of the editorials, and methods for forming compound image schemas, these image schemas are categorized to ascertain the common types of compound image schemas.

## 4 Compound image schemas in environmental risk discourse: types and functions

The analysis reveals that PATH and CONTAINER image schemas are prominently featured in editorials on nuclear contaminated water discharge, forming compound image schemas through integration with other schemas. Within the discourse, 326 instances of compound image schemas were identified, primarily

TABLE 1 Editorial information (source: created by the author, based on collected data).

Phase	No	Publication date	Editorial title	Japanese words count
Official announcement	1	2021-04-13	韓国政府「許せぬ措置」福島第一の処理水放出 (The South Korean Government's "Unforgivable Measure" Fukushima Daiichi's Treated Water Discharge)	881
	2	2021-04-13	原発事故10年、処理水放出決定 政府、2年後めど 漁業者らは反発 (10 Years After the Nuclear Accident, Decision to Discharge Treated Water; Government Aims for Discharge in Two Years, Fishery Workers Oppose)	1,886
	3	2021-04-14	放出、本命視のまま10年 自転車操業、タンク増設 福島第一 (Discharge, a crucial 10 years of cycling operations, increasing tanks at Fukushima Daiichi)	2,669
	4	2021-04-14	先送り限界、放出決定 対話難渋の末、政治決断演出 福島第一 (Limit on Delays Reached, decision to discharge After difficult dialogue, a political decision staged at Fukushima Daiichi)	2,706
	5	2021-04-14	唐突な政治判断、地元反対押し切り 処理水海洋放出へ 原発取材センター長・福島総局長、村山知博 (Abrupt political decision, overriding local opposition for the sea discharge of treated water Tomohiro Murayama, Head of Nuclear Power Plant Reporting Center at Fukushima)	647
	6	2021-04-15	処理水放出決定、中韓が提訴視野 海洋法裁に (Decision to discharge treated water, China and South Korea consider lawsuit to the International Tribunal for the Law of the Sea)	539
Formal discharge	7	2023-08-25	処理水放出、割れる賛否政治的關係が影響も (Treated water discharge, divided opinions influenced by political relationships)	1,254
	8	2023-08-25	風評克服、いつになれば福島、立ち直るさなかの処理水放出 (Overcoming Reputation, How Fukushima Recovers Amid Treated Water Discharge)	3,217
	9	2023-08-25	「想定外」の全面禁輸中国、政治問題化議論かみ合わず 処理水放出 ("Unexpected" comprehensive ban from China, political discussion at a deadlock over treated water discharge)	2,762
	10	2023-08-26	中国の禁輸筋が通らぬ威圧やめよ (China's Import Ban Unjustified, Pressure Must Stop)	997
	11	2023-08-27	公明代表が訪中延期 中国「適切な時期ではない」 (Komeito representative's visit to China postponed "Not the right time," says China)	605

classified into path-type, container-type, and other compound image schemas. The classification as a "path-type compound image schema" or "container-type compound image schema" depends on the context of the clause and the functions of the basic image schemas when PATH and CONTAINER schemas merge. Since "other compound image schemas" appear less frequently and exhibit diverse characteristics, this analysis focuses primarily on path-type and container-type compound image schemas.

The PATH schema, derived from human embodied experiences, serves as an essential cognitive framework for the comprehension and conceptualization of complex constructs. Perception of motion involves sensing a direction, an origin, a destination, and a series of positions connecting the start to the end (Holland, 2018). Consequently, entities involved in motion typically encompass four elements: SOURCE, PATH, GOAL, and MOMENTUM. The embodiment of the PATH schema suggests that a path's specificity and clarity correlate

positively with discourse credibility. Thus, a well-defined and organized PATH schema facilitates readers or listeners in grasping discourse producers' assertions and stances, enhancing the propositions' legitimization. In contrast, a PATH schema with a disorganized structure and vague objectives impedes the effective conveyance of sentence meaning and the attainment of discourse goals. Analogous to the PATH schema, bodily experience informs people that the human body can act as a CONTAINER. The CONTAINER schema enables the application of tangible or abstract containers to realms such as space or time. By employing the CONTAINER schema, discourse producers can conceptualize complex linguistic notions, perceiving concepts like governments, organizations, and groups as bounded containers, thus delineating "in-group" and "out-group" settings. This delineation fosters cognitive separation between "us" and "them" and garners support for discourse perspectives and attitudes amidst the quest for "in-group" identity recognition.

A comparison of image schema distributions across the “official announcement” and “formal discharge” phases unveils a prominence of path-type compound image schemas, particularly PATH + GOAL and AGENT + PATH, along with container-type schemas primarily represented by CONTAINER + PATH during the “official announcement” phase. These schemas underscore Japan’s extensive efforts toward resolving the Fukushima crisis and promoting recovery. During the “formal discharge” phase, path-type schemas, notably AGENT + PATH and PATH + SCALES, gain prominence, underscoring the distinct actions of various stakeholders and the degree of situational progression, like the environmental consequences of wastewater discharge and the responses from the fishing community and neighboring countries.

#### 4.1 Path-type compound image schemas

Path-type compound image schemas highlight the linear progression of events, effectively reflecting the discourse producers’ communicative purposes (Liu and Hu, 2022). As shown in Table 2, within the editorials analyzed in this study, the proportion of path-type compound schemas reaches 71.2%, significantly higher than the 14.7% share of container-type compound schemas.

- (1) 既定路線の海洋放出 (PATH—海洋放出)が決定されたのは、タンクが敷地の空きスペースが逼迫し、廃炉作業へ (GOAL—廃炉作業)の支障すら (BLOCKAGE—支障)懸念されてからだった。

Kite rosen no kaiyō hōshutsu (PATH—*kaiyō hōshutsu*) ga kettei sareta no wa, tanku ga shikichi no aki supēsu ga hippaku shi, hairyō sagyō e (GOAL—*hairyō sagyō*) no shishō sura (BLOCKAGE—*shishō*) kenen sarete kara datta.

The decision to discharge treated water into the sea along the predetermined route (PATH—*discharge treated water into the sea*) was made when it became apparent that the site’s available space for tanks was becoming limited, raising concerns that this could even become an obstacle (BLOCKAGE—*obstruction*) to the decommissioning process (GOAL—*decommissioning*).

(Asahi Shimbun, 2021/04/14, no. 3)

In our daily interactions with objects and individuals within our surroundings, we often face obstacles that impede the positive progression of events. This experience gives rise to the BLOCKAGE schema, wherein individuals confronted with obstructions generally seek ways to overcome, bypass, or traverse these hindrances (Johnson, 1987). Blockages typically denote the obstruction of force, associated with negative implications, reflected in the construction of sentences using argument and predicate structures. Predicate structures serve as a linguistic device for attributing specific qualities to people, objects, events, actions, or social phenomena, delineating essential processes and outcomes (Zhang and Zhang, 2022:89).

In Example (1), the noun “路線” (route) activates the path schema, with the particle “の” (into) designating the goal of the path as “海洋放出” (discharge into the sea) metaphorically rendering the decommissioning process as a “path.” Following this, the noun “支障” (obstacle) triggers the blockage schema, and the context explicitly denotes that the limited available space for “タンク” (tanks) has become a significant encumbrance to the decommissioning efforts. Thus, through the amalgamation of basic image schemas, Example (1) metaphorically portrays the limited available space for nuclear-contaminated water storage as an obstacle on the path to decommissioning, crafting a path-type compound image schema of PATH + GOAL + BLOCKAGE.

Within this framework, as depicted in Figure 3, releasing nuclear-contaminated water into the ocean is perceived as an essential measure to alleviate the “obstacle.” By employing a clear, logically structured path-type compound image schema to distinctly showcase the agentive actions, the act of discharging nuclear-contaminated water is characterized as a vital step towards reducing the obstacle, thereby lending rational support to the Japanese government’s policy decision.

- (2) (全国漁業協同組合連合会)のもろ手を挙げ賛成を得られないなら、首相 (AGENT—日本政府)が直談判して風評対策などを約束し手続きを進める (PATH—手続きを進めるプロセス)しかない (BLOCKAGE—全漁連)。

(Zenkoku gyogyō kyōdō kumiai rengōkai no) morote o age sansei o erarenainara, shushō (AGENT—*Nihon seifu*) ga jikodanpan shite fūhyō taisaku nado o yakusoku shi tetsuzuki o susumeru (PATH—*tetsuzuki o susumeru purosese*) shikanai (BLOCKAGE—*from JF Zengyoren*).

TABLE 2 Compound image schema distribution in nuclear contaminated water discharge editorials (N = 326) (source: created by the author, based on research data).

Type of compound image schema	Schema composition	Quantity and percentage in official announcement phase	Quantity and percentage in formal discharge phase	Total
Path-type compound image schema	PATH + GOAL	46(38.9%)	11(9.6%)	232 (71.2%)
	PATH + SCALES	21(17.8%)	45(39.5%)	
	AGENT + PATH	38(32.2%)	47(41.2%)	
	PATH + OTHER	13(11.0%)	11(9.6%)	
Container-type compound image schema	AGENT + CONTAINER	11(33.3%)	3(20.0%)	48 (14.7%)
	CONTAINER + PATH	18(54.5%)	3(20.0%)	
	CONTAINER + OTHER	4(12.1%)	9(60.0%)	
Other compound image schemas		18 types total   34	12 types total   12	46 (14.1%)

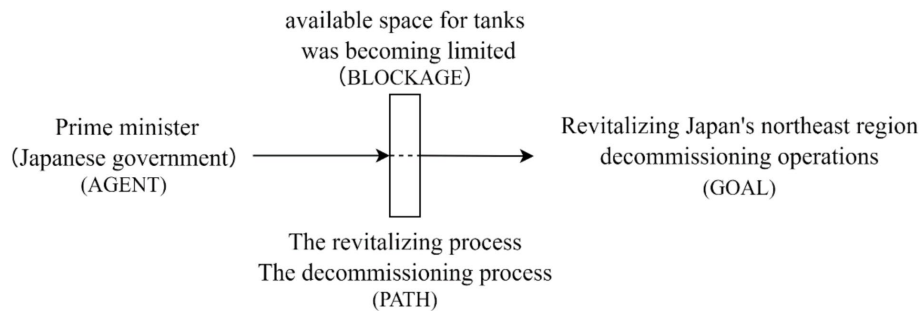


FIGURE 3

Analysis of compound image schema (Example 1) (source: created by the author, based on research data).

Without sufficient support from the National Federation of Fisheries Cooperative Associations (JF *Zengyoren*), the prime minister (AGENT—the Japanese government) has no choice but to personally negotiate, promising measures against reputational damage, and proceed with (PATH—process of advancing procedures) despite the obstruction (BLOCKAGE—from JF *Zengyoren*).

(*Asahi Shimbun*, 2021/04/14, no. 4)

The National Federation of Fisheries Cooperative Associations, also known as “JF *Zengyoren*,” represents Japanese fishermen. JF *Zengyoren* opposes dumping nuclear-contaminated water into the sea due to fears of its potentially harmful effects on fishing. The document illustrates that the verb “進める” (proceed with) is used to metaphorically depict the act of releasing contaminated water as moving along a pathway. It is argued that if the Japanese government does not secure JF *Zengyoren*’s full backing on this issue, the Prime Minister will have no choice but to personally take charge of pushing through these measures. Essentially, JF *Zengyoren* is likened to a roadblock in this scenario, creating a metaphorical image of an AGENT (the Prime Minister) encountering a BLOCKAGE (JF *Zengyoren*) along a PATH (the process of water discharge). The verb “進める” (proceed with) metaphorically illustrates the process of overcoming this obstruction. JF *Zengyoren* is depicted as a significant hurdle not just in addressing Fukushima’s nuclear-contaminated water issue but also in the broader context of revitalizing Japan’s northeast region, suggesting it must be bypassed or eliminated. Given the magnitude of this obstruction, the narrative suggests that only the direct intervention of the Prime Minister, as a significant force, can clear this path, hinting at the government’s view of JF *Zengyoren*’s stance as fundamentally unreasonable.

- (3) 中国外務省の趙立堅副報道局長(AGENT—中国政府)は14日の定例会見で「海洋は日本のゴミ箱ではなく、太平洋も日本の下水道ではない」などと強く(SCALES—強く)批判し(COMPULSION—外部からの圧力)、周辺国や国際原子力機関(IAEA)との協議が合意に至るまで(PATH—外集団との協議)放出を始めないように求めた(COMPULSION—外部からの圧力)。

Chūgoku gaimushō no Chō Riken fuku hōdō kyokuchō (AGENT—Chūgoku seifu) wa 14-nichi no teirei kaiken de ‘kaiyō wa Nihon no gomibako de wa naku, Taiheiyo mo Nihon no gesuidō de wa nai’ nado to tsuyoku (SCALES—tsuyoku) hihan shi

(COMPULSION—*gaibu kara no atsuruyoku*), shūhenkoku ya kokusai genshiryoku kikan (IAEA) to no kyōgi ga goi ni itaru made (PATH—*gaishūdan to no kyōgi*) hōshutsu o hajimenai yō motometa (COMPULSION—*gaibu kara no atsuruyoku*).

At the regular press conference on the 14th, Deputy Director of the Press Bureau Zhao Lijian of the Chinese Foreign Ministry (AGENT—the Chinese government) strongly criticized (SCALES—intensity; COMPULSION—pressure) Japan, stating, ‘The ocean is not Japan’s trash can, nor is the Pacific Ocean Japan’s sewer,’ and urged (COMPULSION—pressure) Japan not to start discharging until it reaches an agreement (PATH—the process of reaching an agreement with ‘outsiders’) with neighboring countries and the International Atomic Energy Agency (IAEA).

(*Asahi Shimbun*, 2021/04/15, no. 6)

The concept of compulsion, as a subset of the broader notion of force, stems from our understanding of force as something that has a source, strength, and direction. For instance, in situations where a crowd begins to push, one might feel driven by an almost inescapable force, moving along a predetermined path (Johnson, 1987). This idea of compulsion in discourse allows for the application of a tangible or intangible force upon the reader, aimed at achieving particular communicative objectives. In Example (3), the use of the phrase “合意に至るまで” (until it reaches an agreement) brings the PATH schema into play, likening the Japanese government’s efforts to reach agreements with its neighbors and international entities to traveling along a pathway. Meanwhile, the verbs “批判する” (criticize) and “求める” (urge) activate the COMPULSION schema. When intertwined with the path schema, they create a nuanced compound image schema of AGENT + SCALES + COMPULSION + PATH, illustrating how compulsion exerts its influence. Within this layered schema, the force of compulsion emanates from the Chinese government, aimed squarely at Japan’s decisions regarding the disposal of nuclear-contaminated water. This effectively emphasizes the narrative focus on the actions of societal actors.

In Example (3), the objectivity of the report seems to be maintained through the direct citation of comments from a spokesperson for the Chinese Ministry of Foreign Affairs. Nevertheless, given that the primary audience of this news piece consists of the Japanese public, who share an “in-group” alignment with the Japanese government, the consistently opposing Chinese government and its spokesperson are cast as part of an “out-group.” The Japanese media posits that the Chinese government aims to politicize the issue of discharging

nuclear-contaminated water, a perspective colored by the differing stances of the involved parties. This framing suggests to the news's primary audience that the compound image schema in Example (3) illustrates a force directed from the "out-group" toward the "in-group," representing a discursive threat to the latter. In such a scenario, the path schema delineates "in-group" from "out-group" identities, where the discourse and judgments of the "out-group" bear negative implications, clashing with and standing in opposition to those of the "in-group." Such portrayal inevitably provokes skepticism within the "in-group" regarding the legitimacy of the "out-group's" stance.

- (4) もともと処理水の海洋放出に慎重だった南太平洋の国々 (AGENT—南太平洋の国々)では、7月のIAEAの調査報告の発表後に態度を変えてきた (PATH—態度の変化) 国も少なくない。

motomoto shorisui no kaiyō hōshutsu ni shinchō datta Minami Taiheiyō no kuniguni (AGENT—*Minami Taiheiyō no kuniguni*) de wa, 7-gatsu no IAEA no chōsa hōkoku no happyōgo ni taido o kaete kita (PATH—*taido no henka*) kuni mo sukunakunai.

After the IAEA released its investigative report in July, numerous South Pacific countries (AGENT—*South Pacific Island countries*), initially cautious regarding the ocean discharge of treated water, have shifted their positions (PATH—*the process of attitude change*). (Asahi Shimbun, 2023/08/25, no. 7)

In the nuclear sector, the International Atomic Energy Agency (IAEA) plays a pivotal role, especially in its stance regarding the Fukushima nuclear-contaminated water discharge issue. Example (4) demonstrates how the use of the verb “~てきた” (have shifted) triggers a path schema, conceptualizing the shifting attitudes of South Pacific countries as a journey, thereby crafting a compound image schema of an agent navigating a path. Following Japan's disclosure of its plan to release the contaminated water into the sea in April 2021, the IAEA dispatched an inspection team. This team verified that the radiation impact from the contaminated water on humans is significantly lower than Japan's regulatory standards (Hamada, 2022). By referencing opinions from third parties like the IAEA and countries in the South Pacific, the discourse producers effectively frame the discharge of nuclear-contaminated water as an internationally accepted practice.

Exclusion, as analyzed in the context of the *Asahi Shimbun's* coverage of the Fukushima contaminated water discharge, is the tactic where discourse producers deliberately overlook certain social actors and their actions to favor a particular group, effectively erasing these actors from the portrayed social reality (Van Leeuwen, 2008). The investigation shows that nearly 70% of the report's references come from government and nuclear industry sources, predominantly supporting the contaminated water discharge (Zhang, 2023). By sidelining opposing views and bringing in neutral international voices like the IAEA, directly quoting their scientific assessments, the producers seem to maintain an objective reportage facade. However, the bulk of the cited information aligns with and legitimizes the Japanese government's controversial decision to release the contaminated water into the ocean.

## 4.2 The container compound image schema

Grounded in the physical experience of space, the CONTAINER schema delineates the interior from the exterior through its

boundaries and spatial organization, metaphorically representing protection and limitation for the entities it encloses (Nabeshima, 2003). This conceptual framework allows discourse producers to sharply define “in-group” versus “out-group,” fostering feelings of either safety or alienation among their audience. Such distinctions contribute to reinforcing connections to or denying certain identities. In the context of legitimization, the audience's ability to recognize and align with “ingroup-outgroup” dynamics is especially crucial.

- (5) 具潤哲國務調整室長(AGENT—韓国政府)は...「周辺国の安全と海洋環境に危険を招く (CONTAINER—日本の周辺国と海洋環境)だけでなく、日本に最も近い隣国である韓国と十分な合意や了解なく行われてきた (PATH—汚染水海洋放出)一方的な措置だ」と語った。

Ku Jun-chul kokumu chōsei shitsuchō (AGENT—*Kankoku seifu*) wa... “shūhenkoku no anzen to kaiyō kankyō ni kiken o maneku (CONTAINER—*Nihon no shūhenkoku to kaiyō kankyō*) dake de naku, Nihon ni motto chikai ringoku de aru Kankoku to jūbun na goi ya ryōkai naku okonawarete kita (PATH—*osen mizu kaiyō hōshutsu*) ippōteki na sochi da” to katatta.

Koo Yoon-chul, chief of the Office for Government Policy Coordination (AGENT—*the South Korean government*), stated, “This unilateral action has been taken (PATH—*the process of discharging nuclear-contaminated water into the sea*) without sufficient consensus or understanding with South Korea, Japan's nearest neighbor, not only posing risks to (CONTAINER—*surrounding countries*) the safety and marine environment of neighboring countries.

(Asahi Shimbun, 2021/04/13, no. 1)

- (6) 韓国の韓憲洙首相(AGENT—韓国政府)は24日、「政府を信じて、科学を信じてください」と国民向けのメッセージを發した (PATH—国民向けのメッセージを發した)。福島にあるIAEAの現地事務所には韓国の専門家を派遣し (PATH—専門家を派遣し)、日本が安全基準を守っているかどうか確認すると発表 (CONTAINER—安全基準の確認を發表)。

Kankoku no Kan Dok-su shushō (AGENT—*Kankoku seifu*) wa 24-nichi, ‘seifu o shinjite, kagaku o shinjite kudasai’ to kokumin muke no messeiji o hashitta (PATH—*kokumin muke no messeiji o hashitta*). Fukushima ni aru IAEA no genchi jimusho ni Kankoku no senmonka o haiken shi (PATH—*senmonka o haiken shi*), Nihon ga anzen kijun o mamotte iru ka dō ka kakunin suru to happyō (CONTAINER—*anzen kijun no kakunin o happyō*).

On July 24, Prime Minister Han Duck-soo (AGENT—*the South Korean government*) issued a message to the citizens (PATH—*conveying a message to the public*), stating, ‘Please trust the government and trust science.’ He further declared that South Korea would send experts to (PATH—*dispatching experts*) the IAEA's local office in Fukushima to conduct a verification to ascertain whether Japan complies with safety standards (CONTAINER—*the process of verification*).

(Asahi Shimbun, 2023/08/25, no. 7)

Examples (5) and (6) reveal how the stance of the South Korean government shifted before and after the formal discharge of nuclear-contaminated water. In Example 5, the narrative employs specific



grammatical markers and verbs to activate the notion of containers and compulsion. The phrase “に危険を招く” (posing risks to) uses the preposition “に” (to) and the verbs “に危険を招く” (posing risks to) to activate the CONTAINER schema, defining the boundaries within which risks occur. Additionally, the verb “語った” (stated) signals the exertion of force, highlighting the COMPULSION schema by indicating pressure on Japan to comply with external demands. The use of spatial movement concepts, i.e., origin, destination, direction, and the connecting path, underscores this narrative (Holland, 2018). Example (5) thus crafts a compound image schema where Japan, as an external actor, moves towards imposing a threat upon the internal group, depicted through a journey metaphor.

In contrast, Example (6), concerning the actual discharge phase, utilizes language that suggests protection and adherence to a path, maintaining the compound image schema but with a delicate shift in narrative focus. The phrase “安全基準を守っているかどうか確認すると発表” (conduct a verification to ascertain whether Japan complies with safety standards) activates a CONTAINER schema as it metaphorically sets the boundaries within which the verification process occurs, suggesting a confined area of operation. As the event’s narrative unfolds, the portrayal of involved parties evolves where the South Korean government’s opposition is prominent in the earlier phase, its stance softens and becomes more ambiguous by the time of actual discharge, reflecting a strategic recalibration of its position.

This narrative shift illustrates how “in-group” and “out-group” identities are fluid and can change based on the discourse entities’ alignments. Although Examples (5) and (6) aim for objectivity by quoting South Korean positions, the framing in the Japanese media context may lead to perceptions of South Korea as an “out-group” contrasted against Japan’s “in-group” alignment with its public. The use of COMPULSION and PATH schemas across these examples highlights varying levels of imposed actions and perceived threats, with the COMPULSION schema indicating a stronger, more forceful impact that is harder to resist compared to the PATH schema. In the discourse around nuclear-contaminated water discharge, the changing tones of South Korea’s opposition pale in semantic force compared to the more pronounced stance taken by China, underscoring the complexities of international relations and public perception in environmental crises.

(7) ブリンケン米務長官 (AGENT—米国政府)は 今月15日の記者会見で「日本の計画は安全で、IAEAの安全基準を含む国際基準に (CONTAINER—国際社会)一致しており、我々は満足している」と語った。

Burinken Beikoku Muchōkan (AGENT—Beikoku seifu) wa kongetsu 15-nichi no kisha kaiken de ‘Nihon no keikaku wa anzen de, IAEA no anzen kijun o fukumu kokusai kijun ni (CONTAINER—kokusai shakai) itchi shite ori, wareware wa manzoku shite iru’ to katatta.

U.S. Secretary of State Blinken (AGENT—the U.S. government), at a press conference on the 15th of this month, stated, “We are satisfied that the Japanese plan is safe and aligns with international standards (CONTAINER—the international community), including those of the IAEA.”

(Asahi Shimbun, 2023/08/25, no. 7)

Much like the path schema, integrating the container schema into basic image schemas is a strategic way to underscore the central theme or issue of an event (Liu and Hu, 2022: 20). Example (7) adeptly

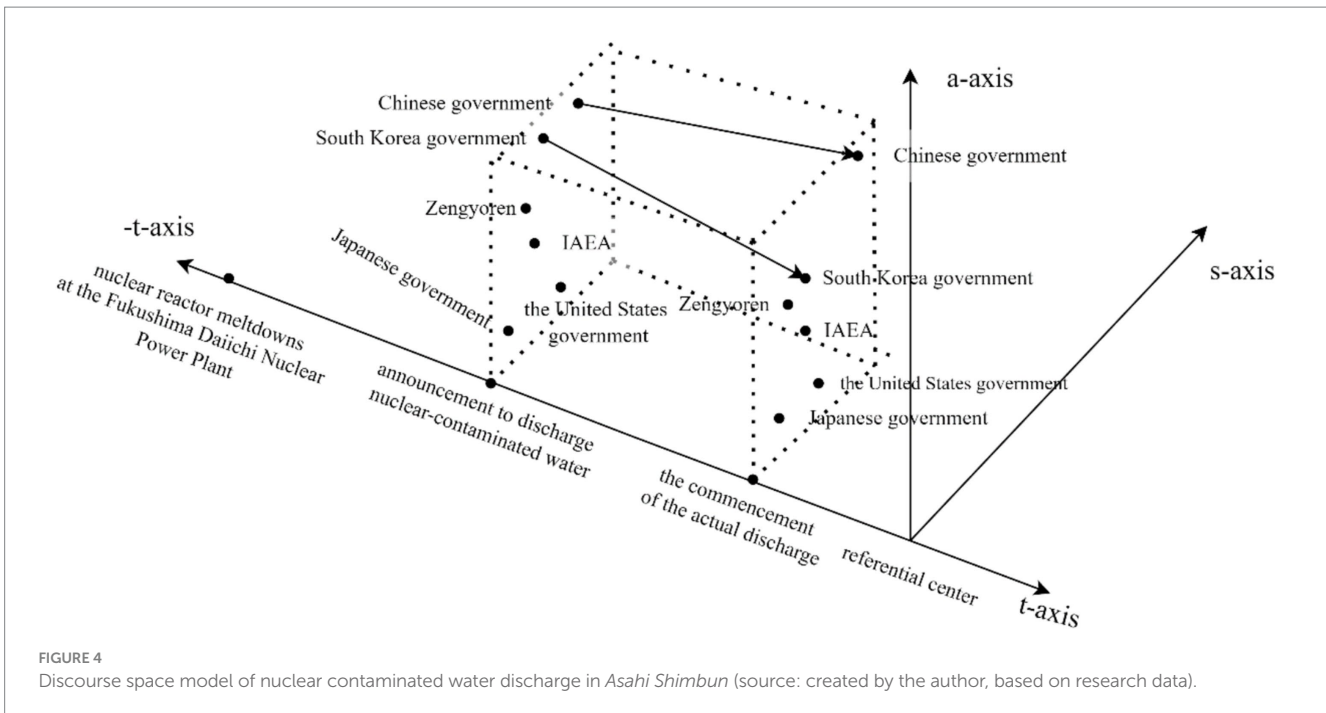
redirects the controversy’s spotlight using a container-based compound image schema. By invoking the concept of “国際基準” (international standards) through a noun, this example triggers the container schema, crafting a complex image of AGENT + CONTAINER. Within this scenario, from a debate standpoint, the United States government serving as the agent is portrayed as a more objectively credible social actor compared to the Japanese government. This sophisticated image underscores that by adhering to globally recognized norms, the Japanese government positions itself as a participant within the broader “international” container. This subtly informs readers that Japan aligns with the international community’s “in-group,” endorsing and upholding global order and regulations. Consequently, Japan’s actions regarding the discharge of nuclear-contaminated water are framed as deserving support and acknowledgment from other “in-group” entities, such as countries and organizations. This narrative technique effectively redirects public scrutiny from questioning the Japanese government’s decision-making process to critiquing the stance of “out-group” countries skeptical of the discharge, thus cleverly shifting the controversy’s focal point.

## 5 Positioning in discourse spaces on environmental risks

The discourse on the discharge of nuclear-contaminated water categorizes stakeholders into two distinct camps based on their stance: those in favor and those against the discharge. In this narrative landscape, entities advocating for the discharge are labeled as the “in-group,” while opponents are tagged as the “out-group.” The stark contrast in viewpoints between these entities results in their varied placement within the discourse space (Chilton, 2004; Hart, 2016).

Discourse pace Theory often employs spatial metaphors to convey the notion of time, with spatial positioning achieved primarily through path and container schemas (Chilton, 2004; Holland, 2018). Hampe (2005) explains that path and container schemas are fundamental image schemas that structure our understanding of abstract concepts by mapping spatial relations onto conceptual domains. An examination of editorials reveals that absolute time expressions appeared in 65% of cases, whereas relative time expressions were used in only 20%, with limited metaphorical significance. An examination of editorials concerning the Fukushima nuclear-contaminated water discharge reveals a preference for absolute over relative time expressions, with the former being used more frequently and the latter rarely carrying metaphorical significance. Consequently, this study organizes the timeline of news editorials around natural time segments, with a focus on two pivotal moments: the date of the Japanese government’s formal announcement to discharge nuclear-contaminated water (April 13, 2021), and the commencement of the actual discharge (August 24, 2023). By scrutinizing the perspectives and stances of the discourse entities at these junctures, the study delineates and shapes the relevant discourse spaces, offering insights into the spatial dynamics of environmental risk communication.

Figure 4 illustrates the positioning of entities such as the United States government, IAEA, and Zengyoren based on their support or opposition to the discharge. These positions and distances are derived from their public statements and media portrayals, reflecting their discursive alignment with or against the Japanese government. The Japanese public and nuclear power companies, mentioned in the explanation, are also included to visualize their influence in the discourse analysis.



In the discourse space model of nuclear contaminated water discharge in *Asahi Shimbun* (Figure 4), the time axis (t-axis) features three significant points on its negative half: the occurrence of the Fukushima nuclear leak in March 2011, the Japanese government's decision in April 2021 to adopt oceanic discharge for treating nuclear-contaminated water, and the actual commencement of the discharge in August 2023. The positive direction of the time axis points towards the future.

On the spatial axis (s-axis), although the media's evaluations of the Japanese public, Japanese government, and nuclear power companies differ in value, these entities share a geographic location and identity within Japan, placing them closer to the referential center in the discourse space. In contrast, foreign governments, including those of China, South Korea, and the United States, are positioned further from this center on the spatial axis.

The positioning of discourse entities on the value axis (a-axis) primarily depends on their supportive or oppositional stance towards the discharge of nuclear-contaminated water. It is notable that within the "Japanese public" group, there are voices explicitly supporting the ocean discharge plan, hoping the Japanese government can effectively address China's ban on seafood imports. Conversely, there is a faction representing local Fukushima residents and fisheries-related personnel, viewing the Japanese government and nuclear power companies as "traitors" who forsake public interest by supporting the discharge plan. "*Asahi Shimbun*" editorials do not directly criticize the stance of the Japanese public but emphasize that the discharge of nuclear-contaminated water is conducted for the benefit of all Japanese citizens, urging the government to protect public interests more effectively. Therefore, this study categorizes discourse entities based on their supportive or oppositional stance, without discussing the Japanese public as a separate discourse entity.

Entities consistently supporting the discharge include the Japanese government, nuclear power companies, and the United States government. The Japanese government's decision is seen as a deviation from its self-proclaimed image as a responsible environmental steward. The discharge plan is commonly portrayed as the "inevitable

path" to "achieving Fukushima's revival" and "resolving the nuclear disaster." In this narrative, the Japanese government and nuclear power companies, as decision-makers and actors (AGENT) and the source of action (SOURCE), assert their leadership on the issue.

In specific social issues, discourse producers often create information asymmetry by concealing private information, facilitating the legitimization of power and interest relationships at the level of perception construction. Simultaneously, the selection process of information sources reflects underlying power structures and values. In the nuclear-contaminated water discharge event, discourse producers mention opposition voices less frequently, focusing the narrative on the Japanese government and emphasizing that the government should advance the discharge work based on respecting the opinions of local people and related fisheries personnel. This selective quoting dominance allows the Japanese government and nuclear power companies to control the discourse, marginalizing oppositional voices. This phenomenon is evident both before and after the discharge decision, showcasing the Japanese government's core positioning and consistent stance in the discourse space. In comparison, nuclear power companies are less prominently featured in reports, usually mentioned alongside the Japanese government. Discussions focus on measuring the radiation levels of nuclear-contaminated water and verifying its safety, indicating their subordinate position in the discourse space to the stance of the Japanese government.

Regarding international discourse entities supporting the discharge, the United States government and the International Atomic Energy Agency (IAEA) play major roles. Japanese media, by selectively quoting sources, exclude opposition voices from China and most Pacific Island countries, preferring to quote authoritative organizations or individuals such as U.S. government spokespersons and the IAEA. Zhang (2023) highlights that international media, particularly from China and South Korea, framed the discharge as an environmental and political violation, contrasting sharply with the Japanese media's portrayal of the discharge as scientifically justified and internationally acceptable. This approach depicts the Japanese government as adhering to international norms and widely recognized

by the international community. This reporting strategy constructs the Japanese government as a member of the “in-group” within the international community, maintaining consistency in its stance before and after the discharge decision.

On the international stage, neighboring countries like Russia, China, and North Korea have expressed clear concerns and opposition. Especially the Chinese and South Korean governments, as the main discourse entities opposing the discharge, have shown different response patterns.

The Chinese government, as one of the most affected countries, firmly opposes the discharge of nuclear-contaminated water into the sea. Its opposition stance is expressed by combining the COMPULSION (force) and PATH (path) schemas, on one hand, abstracting the Chinese government’s actions and claims as a reactive force imposed from the “outgroup” towards the “in-group,” constructed as a threat from the “out-group,” with a negative value orientation. At the same time, by extensively quoting the container schema, the Japanese government is depicted as a member of the international community, positioning China as an “irrational” “out-group” opposing the discharge of nuclear-contaminated water. On the other hand, measures like China’s ban on Japanese seafood are described as “sudden,” portraying the Japanese government and fisheries personnel as “unaware” victims, constructing the Chinese government as a “hysterical,” “unscientific,” and “deliberately manipulating public opinion” attacker. Simultaneously, it emphasizes that the Chinese government uses its vast market to exert “irrational” pressure on Japan, visualized as an “evil giant.” Overall, the Chinese government is positioned as a powerful force opposing the discharge of nuclear-contaminated water into the sea in the discourse space, with its position on the value axis moving further away from the origin over time, reflecting its significant difference from the Japanese government’s “in-group” stance.

The South Korean government initially held a stance similar to the Chinese government, expressing strong opposition to the discharge of nuclear-contaminated water from Japan. However, over time, its opposition weakened, and its position on the value axis gradually moved closer to the origin, showing a trend towards neutralization. In the early stages of announcing the nuclear-contaminated water discharge, the South Korean government used relatively mild path-type schemas to express its opposition to the discharge. When reporting the South Korean government’s attitude, Japanese media less frequently used the compulsion schema and more often utilized the container-type image schema to delineate the boundaries between “in-group” and “out-group,” metaphorically representing the South Korean government as an opponent of the discharge. However, when the nuclear-contaminated water began to be officially discharged, the South Korean government called for respect for science and adopted a more rational and supportive stance towards the discharge. In the discourse space model, this shift in perspective reflects a move towards a more moderate stance on the value axis, positioning South Korea closer to the center compared to more polarized positions.

## 6 Strategies of legitimization and cognitive mechanisms in discourse on environmental risks

Image schemas are essential tools for interpreting and understanding the dynamics of the external world, particularly in the

discourse on the discharge of Fukushima’s nuclear-contaminated water (Guo et al., 2020). By creating compound image schemas from simpler ones, discourse producers shape readers’ perceptions and actions, guiding them toward legitimizing the stance on nuclear-contaminated water discharge.

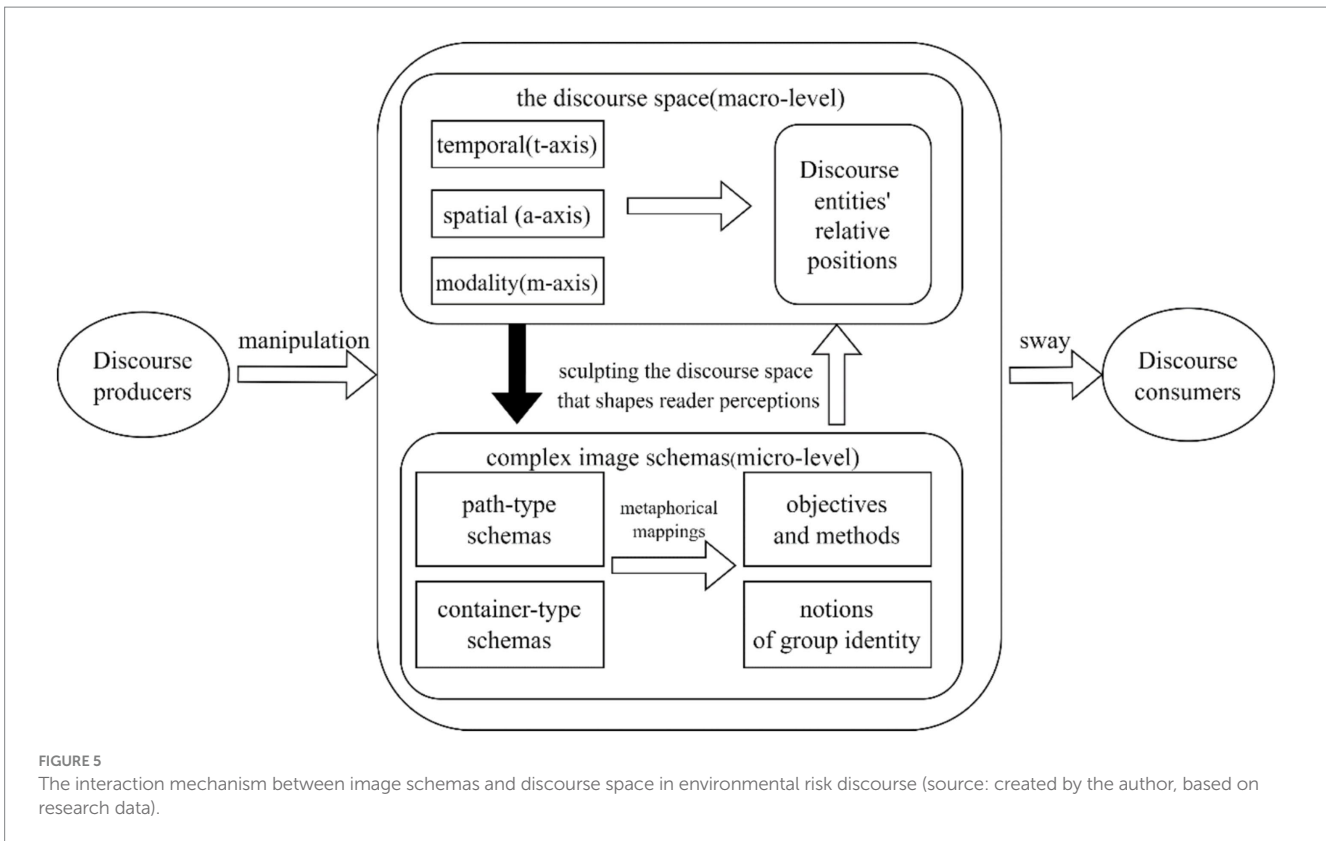
Figure 5 illustrates how, in the debate on Fukushima’s nuclear-contaminated water, various basic image schemas, such as paths and containers, weave together to form intricate patterns. These patterns, combined with discourse strategies like framing and exclusion, manipulate the narrative, influencing how discourse consumers perceive the legitimacy of actions. Similarly, as Ho and Kristiansen (2019) emphasize, strategic media use shapes public perception, effectively framing the legitimacy of actions within environmental debates.

Compound image schemas, serving as effective discourse strategies, originate from metaphorical mappings that transfer from concrete experiences to abstract ideas. For example, path-type schemas analogize the journey and outcome of a path to the objectives and methods of actions or events in abstract realms. Similarly, container-type schemas translate the internal and boundary definitions of a container to notions of group identity within a discourse. This interplay of mapping and comprehension not only reflects the cognitive journey of the discourse audience but also scaffolds the broader narrative, influencing the audience’s perception of identities and positions within the issue. Through such cognitive mechanisms, environmental risk discourse significantly influences specific messages and public sentiment, shaping collective attitudes towards events like the Fukushima nuclear-contaminated water discharge.

Tollefson (2014) provides an analysis that can enhance the understanding of how news discourse may reinforce national identity and the ideology of technoscience in Japan. For instance, the strategic use of discourse aligns public perception with the government’s nuclear energy policy, effectively utilizing image schemas to construct a narrative framework that legitimizes governmental actions and mitigates the perceived risks associated with the disaster.

In the discourse about Fukushima’s nuclear-contaminated water discharge, *Asahi Shimbun* and the Japanese government, sharing similar perspectives, act collectively as the discourse architects, while the Japanese populace engages as the narrative audience. By leveraging micro-level strategies like image schemas, these architects guide the audience’s cognitive journey into a broader narrative space, aiming for persuasive coherence and legitimizing the discharge practices. By casting the constructed ‘reality’ into the discourse’s expansive narrative framework, they provide a comprehensive understanding.

Within this framework, the audience navigates the discourse space, positioning various entities and analyzing the narrative through comprehension efforts. This navigation involves not only grasping the events but also understanding underlying stances, identities, and actions. Through this layered cognitive and interpretive process, the discourse architects effectively steer public perception, shaping societal views on the nuclear-contaminated water discharge issue and influencing public reactions and attitudes. This process showcases the transformative power of discourse space in shaping public cognition and highlights the pivotal role of discourse architects in guiding this narrative journey.



## 7 Conclusion

This study, grounded in Critical Cognitive Linguistics, examines editorials on the Fukushima nuclear-contaminated water discharge, providing insights into the creation, types, and metaphorical impacts of compound image schemas within the discourse on environmental risks. It investigates how discourse producers utilize these schemas to shape and define discourse spaces, ultimately aiding in legitimizing their stances on policy issues.

The key findings reveal that environmental risk discourse is characterized by a diversity of entities and compound image schemas, including the Japanese government, nuclear entities, “JF *Zengyoren*” (The National Federation of Fisheries Cooperative Associations), and various national and international bodies. These actors employ path and container schemas to construct discourse. Specifically, editorials use path schemas to outline actions and intentions, enhancing discourse credibility and supporting the legitimization of viewpoints. Container schemas, on the other hand, are used to delineate in-group and out-group identities, helping readers navigate the complex narratives of environmental risk and subtly endorsing in-group perspectives.

Moreover, compound image schemas serve as bridges in metaphorical mappings, translating tangible or abstract phenomena into conceptual realms, thus sculpting the discourse space that shapes reader perceptions. This strategic use of information sources creates ideologically charged schemas, weaving preconceived discourse narratives into the public consciousness and steering the discourse toward legitimizing certain actions.

The cognitive dynamics of environmental risk discourse unfold through the manipulation of schemas, projecting tailored macro-discourse spaces into the public cognitive sphere. This projection, built on pre-established discourse positions, facilitates the translation of constructed narratives into schema-driven interpretations, showcasing a sophisticated interplay between micro-level schemas and macro-level discourse spaces.

This investigation underscores that discourse comprehension is a collaborative effort, shaped by the interplay between discourse architects, the audience, and the strategic use of compound image schemas. However, as Hart (2016) points out, empirical validation is necessary to determine how these cognitive structures truly impact the readers’ perception. Future studies should incorporate reception studies to empirically test the cognitive effects of discourse strategies and their influence on public opinion. By thoughtfully curating and applying these micro-discourse strategies, discourse producers craft nuanced narratives of “in-group” versus “out-group” dynamics within the discourse space and influence public perception, seamlessly legitimizing their advocacies in the realm of environmental risk.

## Data availability statement

The original contributions presented in the study are included in the article/supplementary material, further inquiries can be directed to the corresponding author.

## Author contributions

CS: Data curation, Formal analysis, Investigation, Writing – original draft. CW: Data curation, Investigation, Writing – review & editing, Formal analysis. WL: Conceptualization, Supervision, Writing – review & editing.

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## References

- Besold, T. R., Hedblom, M. M., and Kutz, O. (2017). A narrative in three acts: using combinations of image schemas to model events. *Biol. Insp. Cogn. Arch.* 19, 10–20. doi: 10.1016/j.bica.2016.11.001
- Chang, Y. C., and Zhao, Y. (2012). The Fukushima nuclear Power Station incident and marine pollution. *Mar. Pollut. Bull.* 64, 897–901. doi: 10.1016/j.marpolbul.2012.01.038
- Chang, Y. C., Zhao, X., and Han, Y. (2022). Responsibility under international law to prevent marine pollution from radioactive waste. *Ocean Coast. Manag.* 227:106294. doi: 10.1016/j.ocecoaman.2022.106294
- Chang, Y. C., Zhao, X., Jian, A., and Tan, Y. (2024). Frontier issues in international ocean governance: Japan's discharge of nuclear contaminated water into the sea. *Mar. Pollut. Bull.* 198:115853. doi: 10.1016/j.marpolbul.2023.115853
- Chilton, P. (2004). *Analysing political discourse: Theory and practice*. London: Routledge.
- Guo, Y., Li, Y., and Chen, L. (2020). After Fukushima: how do news media impact the Japanese public's risk perception and anxiety regarding nuclear radiation. *Environ. Commun.* 14, 97–111. doi: 10.1080/17524032.2019.1614966
- Hamada, T. (2022). The issues concerning the Japanese governmental decision to discharge ALPS-treated water into the sea. *Hokkai Gakuen Univ. J. Econ.* 70, 1–63. Available at: <http://hokuga.hgu.jp/dspace/handle/123456789/4523>
- Hampe, B. (2005). *From perception to meaning: Image schemas in cognitive linguistics*. Berlin, New York: De Gruyter Mouton.
- Hart, C. (2016). Event-frames affect blame assignment and perception of aggression in discourse on political protest: an experimental case study in critical discourse analysis. *Appl. Linguis.* 39, amw017–amw421. doi: 10.1093/applin/amw017
- Hart, C., and Cap, P. (Eds.) (2014). *Contemporary critical discourse studies*. London: Bloomsbury.
- Hedblom, M. (2020). *Image schemas and concept invention: Cognitive, logical, and linguistic investigations*. Switzerland: Springer Nature.
- Ho, S. S., and Kristiansen, S. (2019). Environmental debates over nuclear energy: media, communication, and the public. *Environ. Commun.* 13, 431–439. doi: 10.1080/17524032.2019.1603018
- Holland, J. (2018). *Mental models in manifesto texts: The case of students for a democratic society and weatherman*. Lancaster: Lancaster University.
- Johnson, M. (1987). *The body in the mind: the bodily basis of meaning, imagination, and reason*. Chicago: University of Chicago Press.
- Juraite, K., and Telesiene, A. (2009). Environmental risk in media discourses: theoretical and methodological approaches. *Filosofija Sociologija* 4, 227–236.
- Kimmel, M. (2005). From metaphor to the “mental sketchpad”: literary macrostructure and compound image schemas in heart of darkness. *Metaphor. Symb.* 20, 199–238. doi: 10.1207/s15327868ms2003\_3

## Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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- Krzyszowski, T. (1993). “The axiological parameter in Preconceptual image schemata” in *Conceptualisation and mental processing in language*. eds. R. A. Geiger and B. Rudzka-Ostyn (Berlin/New York: Mouton de Gruyter).
- Li, Y. (2004). Container schemas and container metaphors. *J. Southw. Minzu Univ.* 5, 448–451.
- Li, W. X. (2019). Differences and similarities in cognitive perceptions of Chinese and Japanese learners: Centering on image schemas and conceptual metaphors. Japan: University of Tsukuba.
- Liu, T. (2016). Communicating environment or environmental communication: searching for academic history and research framework of environmental communication. *Journal. Commun.* 7, 91–103.
- Liu, W. Y., and Hu, Y. (2022). Types of compound image schemas and metaphor mapping in political discourse: a case study of Cameron's “Brexit” speech. *Foreign Lang. Teach.* 1, 15–24. doi: 10.13458/j.cnki.flatt.004839
- Nabeshima, K. (2003). The structure of metaphor and meaning: Exploring its relationship with primary metaphors and image schemas. *Studies in Cognitive Linguistics.* 2, 25–109.
- Sugai, M. (2001). A meaning-based analysis of the Japanese case system. *Stud. Linguist. Exp.* 17, 109–119. Available at: <https://hyogo-u.repo.nii.ac.jp/records/356>
- Tollefson, J. W. (2014). The discursive reproduction of technoscience and Japanese national identity in the daily Yomiuri coverage of the Fukushima nuclear disaster. *Discourse Commun.* 8, 299–317. doi: 10.1177/1750481313510817
- Tseng, M. (2007). Exploring image schemas as a critical concept: toward a critical-cognitive linguistic account of image-schematic interactions. *J. Lit. Semant.* 36, 135–157. doi: 10.1515/JLS.2007.008
- Utsunomiya, Y. (2002). Extension of event image Schema to linguistic phenomena, bulletin, Faculty of Education, Shizuoka University. *Liberal Arts Soc. Sci. Series* 52, 1–17. doi: 10.14945/00001165
- Van Leeuwen, T. (2008). *Discourse and practice: New tools for discourse analysis*. Oxford: Oxford University Press.
- Yue, H. P., and Wang, H. (2011). The image schema view of spatial-temporal metaphors in English and Chinese. *Foreign Lang. Teach.* 2, 24–27. doi: 10.13458/j.cnki.flatt.000348
- Zhang, L. (2023). Critical discourse analysis of media reports related to the ocean release of Fukushima nuclear power plant treated water: focusing on the editorial of “Asahi Shimbun”. *East Asian Lang. Cult. Res.* 50, 110–119. Available at: <http://id.nll.go.jp/bib/033077489>
- Zhang, H., and Zhang, T. W. (2022). *Critical cognitive linguistics*. Beijing: Foreign Language Teaching and Research Press.