Diyala Journal
for Human Research
Website:
djhr.uodiyala.edu.iq

مجلة ديالى
للبحوث الإنسانية

p ISSN: 2663-7405
e ISSN: 2789-6838

العدد (107) المجلد (2) اذار 2026

مجلة ديالى للبحوث الانسانية

Academic Scientific Journals

From Astronomical Distance to Cognitive Familiarity: Conceptual Metaphor and Conceptual Blending in NASA's James Webb Space Telescope Discourse A Cognitive-Stylistic Study

Inst .Emmad Ahmed Farhood
Department of English /College of Education for Humanities
University of Diyala

Email:
Immad.en.hum@uodiyala.edu.iq

Abstract

Popular-scientific discourse must make phenomena that lie far beyond direct human experience imaginable to non-specialist readers. This article examines how NASA's public-facing discourse on the James Webb Space Telescope (JWST) meets this challenge. Combining Conceptual Metaphor Theory (CMT) and Conceptual Blending Theory (CBT) within a cognitive-stylistic framework, it analyzes a purposively selected corpus of five NASA Science articles (2024–2026) on Arp 142, the Hubble tension, the Cranium Nebula, the FS Tau star-forming region, and the Lion Nebula. Metaphorical expressions were identified through a procedure adapted from the Metaphor Identification Procedure (MIP), classified by source domain, and counted (22 coded instances in seven categories). Selected passages were then analyzed through CBT to show how several conceptual spaces are integrated into emergent scenes. The results show that cosmic structures are most frequently conceptualized as bodies and animals (40.9% of coded instances), followed by galactic interaction as dance or movement (18.2%) and astronomical activity as celebration or fireworks (13.6%). The blending analysis shows that these mappings often co-occur and combine, most clearly in the Arp 142 text. The article proposes the notion of experientialization of astronomy to describe the translation of astronomical-scale phenomena into human-scale experience, and discusses both the explanatory gains and the potential risks of this strategy.

Published: 1- 3-2026

Keywords: cognitive stylistics; conceptual metaphor; conceptual blending; science communication; NASA; James Webb Space Telescope; popular-scientific discourse

هذه مقالة وصول مفتوح بموجب ترخيص
CC BY 4.0
(http://creativecommons.org/licenses/by/4.0/)

الملخص

يضطلع الخطاب العلمي الموجَّه إلى الجمهور العام بمهمة معرفية وتواصلية تتمثل في إتاحة تصوّر الظواهر التي تتجاوز، إلى حد بعيد، حدود الخبرة الإنسانية المباشرة، وتيسير استيعابها لدى القرّاء من غير المتخصصين. وتتناول هذه المقالة الكيفية التي يوظّف بها الخطاب الموجَّه إلى الجمهور والصادر عن وكالة ناسا بشأن تلسكوب جيمس ويب الفضائي (JWST) الآليات المفهومية واللغوية لمواجهة هذا التحدي. وفي إطار مقاربة قائمة على الأسلوبية المعرفية، توظّف الدراسة نظرية الاستعارة المفهومية (CMT)ونظرية المزج المفهومي (CBT) في تحليل مدوّنة نصية اختيرت اختيارًا قصديًا، وتتألف من خمسة مقالات منشورة ضمن موقع ناسا للعلوم خلال المدة الممتدة من عام 2024 إلى عام 2026، وتتناول Arp 142, Hubble Tension, Cranium Nebula, FS Tau, Lion Nebula

وقد جرى تحديد التعبيرات الاستعارية بالاستناد إلى إجراء مُكيَّف من إجراء تحديد الاستعارة(MIP) ، ثم تصنيفها وفقًا لمجالاتها الاساسية ، وإحصاء تواترها؛ إذ أسفرت عملية الترميز عن تحديد 22 حالة استعارية موزعة على سبع فئات. وأُخضعت، بعد ذلك، مقاطع نصية مختارة للتحليل في ضوء نظرية المزج المفهومي، بغية الكشف عن الكيفية التي تتكامل بها فضاءات مفهومية متعددة لتشكيل مشاهد دلالية ناشئة تتجاوز في دلالتها مكوّنات تلك الفضاءات منفردةً.

وتبيّن النتائج أن البنى الكونية تُمثَّل مفهوميًا، على نحو أكثر تواترًا، من خلال استعارات تستند إلى الأجسام الحية والحيوانات، التي تشكّل 40.9% من مجموع الحالات الاستعارية المُرمَّزة. ويأتي بعدها تصوّر التفاعلات المجرّية في صورة الحركة، بنسبة 18.2%، ثم تمثيل الأنشطة الفلكية في صورة الألعاب النارية، بنسبة 13.6%. ويكشف تحليل المزج المفهومي كذلك عن تضافر هذه الإسقاطات الاستعارية وتفاعلها داخل السياقات النصية، بما يؤدي إلى بناء تمثيلات مفهومية مركّبة؛ وتتجلّى هذه الآلية بوضوح خاص في المقال المتعلق Arp 142

وانطلاقًا من هذه النتائج، تقترح المقالة مفهوم *إضفاء الطابع التجريبي على الظواهر الفلكية* (*Experientialization of Astronomy*)، للدلالة على العملية التي تُعاد من خلالها صياغة الظواهر الفلكية ذات المقاييس الكونية في قوالب تصوّرية تستند إلى الخبرة الإنسانية وتقترب من نطاق الإدراك والتجربة المألوفين. وتختتم الدراسة بمناقشة المردود التفسيري لهذه الاستراتيجية في تقريب المعرفة الفلكية إلى الجمهور غير المتخصص، فضلًا عن المخاطر المحتملة الناجمة عن توظيفها، ولا سيما ما قد تفضي إليه من تبسيط مفرط للظواهر الكونية أو إعادة تشكيل تمثيلاتها المفهومية على نحو يستدعي النظر النقدي.

1. Introduction

Scientific communication requires not only accuracy but also effective ways of making specialized knowledge accessible to non-specialist audiences. The challenge is acute in astronomy, where galaxies, nebulae, and stellar formation are remote in scale, time, and perceptual access. NASA's public-facing discourse on the James Webb Space Telescope addresses this challenge through vivid conceptualizations that draw on familiar domains such as the human body, animals, movement, celebration, and everyday perception.

From a cognitive-linguistic perspective, such choices are not mere stylistic decoration. Metaphor is a means of understanding one domain of experience in terms of another (Lakoff & Johnson, 1980), and it provides conceptual structure through which readers can organize and imagine unfamiliar phenomena. Cognitive stylistics, which examines the relationship between linguistic form,

attention, conceptualization, and meaning construction (Semino & Culpeper, 2002; Stockwell, 2002), offers a suitable framework for investigating this process in scientific texts.

2. Literature Review and Research Gap

2.1 Cognitive stylistics and meaning construction

Cognitive stylistics (also termed cognitive poetics) is an interdisciplinary approach drawing on stylistics, cognitive linguistics, and cognitive science. It moves beyond describing textual features such as lexical choice, syntax, and figurative language to ask how these features guide attention, activate knowledge, structure conceptualization, and contribute to interpretation (Semino & Culpeper, 2002; Stockwell, 2002; Gavins & Steen, 2003). Readers are treated as active participants who draw on linguistic knowledge, context, and prior experience to construct meaning (Semino & Culpeper, 2002). Bretones Callejas et al. (2021) similarly emphasize the interplay of linguistic form, situational context, and cognition. Linguistic expressions are understood to foreground some aspects of experience while backgrounding others, and thereby shape conceptualization.

2.2 Conceptual Metaphor Theory

CMT holds that metaphor is a matter of thought and not only of language: systematic mappings from a concrete source domain to a more abstract or less accessible target domain structure how people reason about experience (Lakoff & Johnson, 1980; Lakoff, 1993). Many source domains are grounded in bodily and perceptual experience (Johnson, 1987; Grady, 1997), and Kövecses (2010) identifies the human body, animals, and movement among the most productive source domains. Lakoff and Turner (1989) distinguish image metaphors, which map the visual shape of one thing onto another, from conceptual mappings that transfer structure and inference. This distinction is relevant to astronomical imagery, in which resemblance (a “penguin,” a “lion”) can serve as an entry point to richer conceptual structure. A core claim of CMT is that mappings are selective: they *highlight* certain features of the target while *hiding* others (Lakoff & Johnson, 1980).

Methodologically, linguistic metaphor identification has been systematized through the Metaphor Identification Procedure (MIP) and its extension, MIPVU (Pragglejaz Group, 2007; Steen et al., 2010), which require analysts to compare the contextual meaning of a lexical unit with a more basic meaning. Such procedures help make metaphor analysis replicable and are widely adopted in discourse-oriented work (Semino, 2008).

2.3 Conceptual Blending Theory

CBT models meaning construction as the integration of partial structure from two or more input spaces, linked by a generic space, into a blended space that

develops emergent structure through composition, completion, and elaboration (Fauconnier & Turner, 1998, 2002). Whereas CMT typically describes directional, two-domain mappings, CBT accommodates networks with multiple inputs and emergent meaning not present in any single input (Grady et al., 1999; Coulson & Oakley, 2000). The two frameworks are therefore best seen as complementary: CMT identifies recurrent mappings, and CBT explains how mappings and other inputs are integrated in specific, local constructions.

2.4 Metaphor in scientific and popular-scientific discourse

Metaphor and analogy have long been argued to play a constitutive and not merely illustrative role in science (Boyd, 1979; Gentner, 1983; Brown, 2003). In popularization, metaphors also mediate between expert and lay knowledge, simplifying complex concepts while shaping how they are interpreted (Knudsen, 2003). Research on translating metaphors in astronomy and astrophysics popularization further shows that figurative language is pervasive in this field (Merakchi, 2020; see also Bicchieri, 1988; Leatherdale, 1974, as cited in Merakchi, 2020).

2.5 Research gap

Three gaps motivate the present study. First, although metaphor in scientific discourse is well documented, comparatively little cognitive-stylistic research has examined NASA's institutional, image-driven discourse on JWST, a mission whose public communication depends heavily on interpreting newly released images. Second, existing work often treats CMT and CBT separately, so the way recurring metaphorical mappings *combine* into integrated, emergent scenes in popular-science texts remains under-examined. Third, studies of this kind frequently rely on illustrative examples without explicit corpus-selection criteria or a transparent coding procedure, which limits replicability. The present study addresses these gaps by combining CMT and CBT in a single design applied to a corpus selected on stated criteria and coded through an explicit procedure.

3. Research Questions and Hypotheses

Research questions

- **RQ1.** Which conceptual metaphors structure the representation of astronomical phenomena in the corpus of NASA JWST articles?
- **RQ2.** How are coded metaphorical instances distributed across source-domain categories, and which domains are most prominent?
- **RQ3.** How do these metaphors guide the conceptualization of astronomical structure, interaction, and activity?
- **RQ4.** How does CBT explain the integration of several conceptual spaces in selected passages?

- **RQ5.** How do metaphor and blending together enhance the cognitive accessibility of distant phenomena?

Hypotheses

- **H1** (RQ1–RQ2). NASA draws systematically on familiar bodily, animal, social, and perceptual source domains, with embodied domains being most frequent.
- **H2** (RQ3). These metaphors function as cognitive structures that organize interpretation, not merely as decoration.
- **H3** (RQ4). CBT accounts for emergent meanings produced when several conceptual domains are activated together.
- **H4** (RQ5). CMT and CBT jointly explain how distant phenomena become cognitively accessible.

4. Methodology

4.1 Research design

The study is a corpus-based, mixed-methods cognitive-stylistic analysis. A quantitative component (frequency and percentage distribution of coded metaphorical instances) establishes the relative prominence of source domains. A qualitative component (CMT mapping analysis and CBT network analysis) interprets how these patterns operate in context.

4.2 Corpus and selection criteria

The corpus consists of five English-language articles published by the NASA Webb Mission Team on NASA Science. Articles were selected purposively according to the criteria in Table 1.

Table 1. Corpus-selection criteria

Criterion	Specification	Rationale
Source authority	Published by the NASA Webb Mission Team on NASA Science	Institutional, official mission discourse
Genre	Public-facing science communication (news release or mission blog), not technical papers	Targets non-specialist readers
Language	English	Consistent linguistic analysis
Period	July 2024 – August 2026	Recent output of a single mission phase
Topical diversity	Articles on different astronomical categories (interacting galaxies, cosmology and distance measurement, nebulae, star-forming regions)	Tests whether patterns recur across phenomena
Figurative	Contains at least one prominent	Ensures material for

Criterion	Specification	Rationale
salience	figurative expression or analogy in its core description	CMT and CBT analysis
Accessibility	Full text publicly available online	Replicability

Articles that were purely technical, consisted only of image captions, or reported mission status without describing an astronomical target were excluded. The selected articles are listed in Table 2.

Table 2. Corpus

Code	Article (NASA Webb Mission Team)	Date	Astronomical target
A1	Vivid portrait of interacting galaxies marks Webb's second anniversary	12 July 2024	Arp 142 (Penguin and Egg)
A2	Webb researchers discover lensed supernova, confirm Hubble tension	1 October 2024	Type Ia supernova; Hubble tension
A3	NASA's Webb examines Cranium Nebula	25 February 2026	Cranium Nebula
A4	NASA's Webb reveals stars sparking to life in cosmic celebration	2 July 2026	FS Tau star-forming region
A5	Lion Nebula roars to life with NASA's Webb	10 August 2026	Lion Nebula

Because the figurative-salience criterion makes the sample purposive, the findings describe metaphor-rich NASA texts and are not generalizable to all NASA or JWST discourse (see Section 7).

4.3 Identification and coding of metaphorical expressions

Metaphorical expressions were identified through a procedure adapted from MIP (Pragglejaz Group, 2007; Steen et al., 2010): (1) each article was read in full to establish its overall meaning; (2) lexical units and short expressions applied to an astronomical target were identified; (3) for each, the contextual meaning was compared with a more basic, concrete meaning from bodily, animal, social, or everyday experience; and (4) where the two contrast but can be understood by comparison, the unit was coded as metaphorical and assigned a source domain and a target element. Source-domain categories were then grouped into conceptual metaphors in CMT notation (TARGET IS SOURCE).

Each distinct source-domain expression mapped onto a target element was counted once per article. The study reports only the instances that were identified and coded under this procedure; it does not claim to capture all figurative language in the articles. Given the small number of coded instances, percentages are descriptive and no inferential statistics are applied.

4.4 Conceptual blending analysis

For selected passages, the blending analysis (1) identifies the input spaces activated by the text, (2) states the cross-space mappings and the selective projection into the blend, and (3) describes the emergent structure, using the notation *Input A + Input B → emergent meaning* (Fauconnier & Turner, 2002). The blending analysis includes analogical constructions in addition to the coded metaphors (for example, the "tension" and trifold-mirror constructions in A2), since CBT applies to integrations that exceed single-domain mappings.

5. Findings

5.1 Conceptual metaphors (RQ1, RQ3)

The articles are examined in corpus order. Table 3 summarizes the major mappings, and the subsections below discuss each article.

Table 3. Major conceptual metaphors in NASA's JWST discourse

Conceptual metaphor	Representative mappings	Cognitive function
COSMIC STRUCTURES ARE BODIES/ANIMALS	eye → galactic center; beak → extended galactic structure; head → upper galactic region; backbone → central galactic structure; tail → extended structure; feathers → stellar and dust structures; face, ears → nebular structure; mane → surrounding nebular structure	Structural and visual organization
GALACTIC INTERACTION IS DANCE/MOVEMENT	dance → gravitational interaction; shimmy, sway → galactic movement; loops → repeated interaction	Dynamism and interaction
ASTRONOMICAL ACTIVITY IS CELEBRATION/FIREWORKS	fireworks → star formation; fireworks → background galaxies; celebration → astronomical activity	Spectacle and affective accessibility
COSMIC ACTIVITY IS ANIMAL LIFE/BEHAVIOR	roaring → nebular activity	Vitality and animation
COSMIC STRUCTURE IS HUMAN BRAIN/BODY	heads → nebular structure; brain → nebular appearance; skull → nebular structure	Embodied organization
A TYPE Ia SUPERNOVA IS A STANDARD CANDLE	candle → Type Ia supernova; known brightness → intrinsic luminosity; light source → distance indicator	Measurement and scientific accessibility
SCIENTIFIC DISCOVERY IS UNLOCKING	locked knowledge → unknown universe; unlocking → scientific discovery	Epistemic accessibility

5.1.1 A1 – Arp 142: cosmic structures as bodies and animals

A1 contains the richest concentration of embodied and visually grounded expressions. The interacting galaxies, the Penguin and the Egg, are described through anatomical vocabulary: "eye," "beak," "head," "backbone," "tail," and "feathers" (NASA Webb Mission Team, 2024a). These expressions map parts of an animal or body onto regions of the galaxy: eye → galactic center (a visual

focal point), beak → extended structure (directional orientation), head → upper region (spatial organization), backbone → central structure (an internal axis), tail → extended structure (spatial extension), and feathers → stellar and dust structures (surface texture and detail). The metaphor does more than establish resemblance: it supplies a structured animal and bodily schema through which the morphology of a distant galaxy can be mentally organized.

The article also represents interaction through movement. Expressions associated with dance, shimmying, swaying, and loops allow the gravitational relationship to be conceptualized through familiar motion, yielding GALACTIC INTERACTION IS DANCE/MOVEMENT. Newly formed stars are described as "fireworks," which maps brightness, sudden emergence, and spectacle onto astronomical activity, and Webb is said to continue to "unlock the mysteries of the universe" (NASA Webb Mission Team, 2024a), conceptualizing the unknown as locked knowledge and observation as unlocking.

5.1.2 A2 – Hubble tension: the Type Ia supernova as a standard candle

A2 describes a Type Ia supernova as a "standard candle" (NASA Webb Mission Team, 2024b). In astronomy, such supernovae serve as distance indicators because their intrinsic brightness can be compared with their observed brightness. The conceptual metaphor A TYPE Ia SUPERNOVA IS A STANDARD CANDLE maps the familiar light source onto the stellar explosion on the basis of known brightness. The metaphor gives an unfamiliar measurement process an everyday frame while preserving the supernova's scientific role as a distance indicator.

5.1.3 A3 – Cranium Nebula: cosmic structure as human brain and body

The overall form of the Cranium Nebula resembles a human cranium, while a dark vertical lane through its center evokes two brain hemispheres (NASA Webb Mission Team, 2026a). COSMIC STRUCTURE IS HUMAN BRAIN/BODY operates at a perceptual level (the skull-like shape) and at a conceptual level (the brain-like organization as a schema for the nebular structure). The bodily source domain thus provides an established organizational schema that readers can transfer to the nebula.

5.1.4 A4 – FS Tau: astronomical activity as celebration and fireworks

A4 describes stars as "sparking to life in cosmic celebration" and associates background galaxies with fireworks (NASA Webb Mission Team, 2026b). The mapping ASTRONOMICAL ACTIVITY IS CELEBRATION/FIREWORKS introduces brightness, sudden emergence, abundance, and spectacle. Its cognitive significance is largely affective: fireworks are experienced as highly noticeable and emotionally engaging, so the mapping encourages readers to construe astronomical activity as a vivid, attention-worthy event instead of an abstract technical process.

5.1.5 A5 – Lion Nebula: cosmic activity as animal life and behavior

A5 describes the nebula as "roaring to life" and develops a lion-based representation through its face-like structure, ears, and surrounding mane (NASA Webb Mission Team, 2026c). The conceptualization operates at two levels: animal *morphology* (face, ears, and mane mapped onto nebular structure) and animal *behavior* ("roaring to life" associating the structure with vitality). The progression can be represented as *cosmic structure → animal form → living presence*. The metaphor does not imply that the nebula literally has consciousness; animal knowledge offers an experiential structure for interpreting both appearance and apparent activity.

5.2 Distribution of coded metaphorical instances (RQ2)

Table 4 presents the frequency and percentage distribution of the 22 coded instances, and Figure 1 displays the same distribution.

Table 4. Distribution of coded metaphorical instances

Conceptual metaphor	Coded instances	Percentage
Cosmic structures as bodies/animals	9	40.9%
Galactic interaction as dance/movement	4	18.2%
Astronomical activity as celebration/fireworks	3	13.6%
Cosmic structure as human brain/body	3	13.6%
Cosmic activity as animal life/behavior	1	4.5%
A Type Ia supernova is a standard candle	1	4.5%
Scientific discovery as unlocking	1	4.5%
Total	**22**	**99.8%** (rounding; exact total 100%)

The distribution shows that cosmic structures as bodies/animals is the most prominent pattern (40.9%), reflecting NASA's reliance on embodied and visually familiar source domains, particularly in the Penguin and Lion Nebula descriptions. Combined with the human brain/body category (13.6%), body- and animal-based mappings of structure account for 54.5% of coded instances (12 of 22). Galactic interaction as dance/movement (18.2%) frames gravitational interaction as an unfolding, dynamic process and supplies a temporal and relational structure. Celebration/fireworks (13.6%) adds an affective, perceptually vivid dimension. The three remaining categories (animal life/behavior, standard candle, and unlocking; 4.5% each) occur once but serve distinct functions: extending the animal domain from appearance to activity, supporting a measurement concept, and framing scientific investigation as access to hidden knowledge.

5.3 Conceptual blending analysis (RQ4)

5.3.1 A1 – Arp 142 as a multispace blend

A1 provides the clearest example of blending, because several conceptual spaces are activated simultaneously (Table 5).

Table 5. Conceptual spaces activated in the Arp 142 blend

Conceptual space	Representative elements	Contribution to the blend
Astronomy	galaxies, gravity, gas, dust, star formation	Scientific domain
Animal	Penguin, Egg, beak, tail, feathers	Animal morphology
Body	eye, head, backbone	Anatomical organization
Movement	motion, loops, interaction	Dynamic relationship
Celebration	fireworks, spectacle	Affective and event structure

These spaces are not interpreted independently. Their integration produces an emergent scene in which galaxies are understood simultaneously through animal-like forms, bodily structures, movement, and celebration:

Galaxy → animal → body → character → dancer → participant in a celebration

CMT can identify the individual mappings, but CBT explains how their simultaneous activation produces a more elaborate conceptual scene. The case illustrates the value of treating the two frameworks as complementary.

5.3.2 A2 – Hubble tension: measurement and physical experience

The expression of measurement differences as “tension” integrates scientific measurement with an embodied understanding of opposing forces (NASA Webb Mission Team, 2024b):

Scientific measurement + physical tension → conceptual conflict

An abstract scientific disagreement is thereby understood through everyday bodily experience without erasing the scientific meaning of the measurements. The gravitational-lensing explanation draws on the familiar experience of a trifold vanity mirror:

Gravitational lensing + trifold-mirror experience → one astronomical event represented through multiple visual and temporal views

The blend extends beyond visual similarity: the mirror provides a model of multiple images, while the differing light paths in lensing explain why the images show different moments of the same explosion. The analogy supports accessibility without replacing the scientific explanation.

5.3.3 A3 – Cranium Nebula: astronomy and human anatomy

The outer nebular morphology activates the skull domain, and its internal organization evokes the brain (NASA Webb Mission Team, 2026a):

Nebular structure + human anatomy → embodied cosmic form

The blend is cognitively economical: an unfamiliar arrangement is interpreted through an established human schema. The anatomical frame does not merely register resemblance; it supplies an interpretive structure for organizing the nebula's internal and external features.

5.3.4 A4 – FS Tau: star formation and celebration

A4 integrates star formation with the spaces of fireworks and celebration (NASA Webb Mission Team, 2026b):

Star formation + fireworks + celebration → cosmic spectacle

The emergent meaning is not simply that stars are bright; astronomical activity is constructed as an event of visual excitement, abundance, and public attention. The blend adds an affective dimension to scientific communication by linking astronomical processes with a culturally familiar event associated with spectacle and wonder.

5.3.5 A5 – Lion Nebula: astronomy and animal representation

The nebula's morphology activates knowledge of a lion's face, ears, and mane, while "roaring to life" extends the representation toward behavior (NASA Webb Mission Team, 2026c):

Astronomical structure + lion → lion-like cosmic presence

The emergent meaning is richer than visual resemblance, because the structure acquires qualities of a recognizable, living animal and becomes a cognitively vivid presence interpretable through both appearance and behavior.

6. Discussion (RQ5)

The combined CMT and CBT analysis shows that NASA's JWST discourse represents complex, distant phenomena through familiar experiential domains: the human body, animals, movement, celebration, and everyday visual experience. This supports H1: embodied source domains are the most frequent in the corpus, in line with the cognitive-linguistic view that bodily experience grounds metaphorical thought (Johnson, 1987; Kövecses, 2010). The prominence of body and animal mappings of *structure* is also consistent with the image-driven nature of JWST communication, where resemblance to a recognizable form is the natural entry point to an image (cf. Lakoff & Turner, 1989). Yet the corpus shows movement from image metaphor towards richer conceptual structure: the Lion Nebula passage extends resemblance to behavior, and the Arp 142 passage adds movement and event structure.

Support for H2 comes from the functions the metaphors perform. They organize structure (eye, backbone, mane), construct dynamics (dance, loops), supply measurement frames (standard candle), and attach an affective evaluation (fireworks, celebration). CBT adds explanatory power (H3): the Arp 142 and FS Tau passages show emergent scenes in which several input spaces are

integrated, and A2 shows that blending is not limited to metaphor in the narrow sense but also covers analogy (the trifold mirror) and conflict-based construals ("tension"). Together, these findings support H4.

The pattern can be described as the **experientialization of astronomy**: phenomena at astronomical scale are interpreted through human-scale, embodied, and culturally familiar experience. In this way NASA's discourse bridges physical remoteness and cognitive accessibility, enabling readers to construct mental representations of phenomena they cannot experience directly.

A cognitive-stylistic reading must also acknowledge the *highlighting and hiding* of metaphor (Lakoff & Johnson, 1980). Animate and celebratory framings foreground visual appeal, vitality, and affect, but may background physical processes, timescales, or uncertainty, and may invite anthropomorphic inferences (for example, that a nebula "behaves"). The corpus mitigates this to some extent by retaining technical explanation alongside figurative description, as in the supernova and lensing passages, but the cognitive effects on actual readers can only be established through reception research (see Section 7).

7. Limitations and Directions for Future Research

Several limitations should be noted. First, the corpus is small and purposively selected for figurative salience, so the quantitative distribution is descriptive and cannot be generalized to all NASA or JWST discourse. Second, the 22 coded instances come from a single coder's application of an adapted MIP procedure; future work should report inter-coder agreement (for example, Cohen's kappa) and adopt the full MIPVU procedure. Third, the unit of counting (distinct source-domain expressions per article) means that frequency reflects the number of mapped elements and not their discourse prominence or length. Fourth, the study analyzes verbal text only, whereas JWST communication is strongly multimodal; analyses of image–text interplay and pictorial metaphor (Forceville, 1996) would be valuable. Fifth, claims about cognitive effects are inferential, since no reader data were collected; eye-tracking, comprehension, or recall experiments could test whether such metaphors in fact improve understanding. Finally, comparison with other agencies (for example, ESA or ESO) or with earlier telescopes such as Hubble would show whether the identified patterns are specific to JWST discourse or typical of astronomy popularization.

8. Conclusion

This article examined NASA's JWST discourse through a cognitive-stylistic design combining CMT and CBT, applied to a corpus selected on explicit criteria and coded through a transparent procedure. NASA draws systematically on bodily, animal, movement-based, celebratory, and everyday source domains. The most prominent pattern conceptualizes cosmic structures as bodies and

animals (40.9% of coded instances), and body- and animal-based mappings of structure together account for 54.5%. The analysis demonstrates that these metaphors serve as cognitive structures, and the blending analysis shows how different conceptual spaces combine into emergent scenes, most clearly in the Arp 142 text. The recurrent movement from physical distance to cognitive proximity, termed here the experientialization of astronomy, makes the universe more imaginable without diminishing the scientific complexity of the phenomena represented. The study thus shows how CMT and CBT complement each other in explaining how scientific knowledge is connected with human experience, while the limitations noted above indicate clear paths for replication and extension.

References

Bicchieri, C. (1988). *Metaphor and scientific explanation* [as cited in Merakchi, 2020; please verify the full bibliographic details before submission].

Boyd, R. (1979). Metaphor and theory change: What is “metaphor” a metaphor for? In A. Ortony (Ed.), *Metaphor and thought* (pp. 356–408). Cambridge University Press.

Bretones Callejas, C. M., Ridao Rodrigo, S., & Alarcón Hermosilla, S. (2021). Language, cognition and style: An introduction to the cognitive stylistics section. *Odisea*, *22*, 9–13. https://doi.org/10.25115/odisea.v0i22.7151

Brown, T. L. (2003). *Making truth: Metaphor in science*. University of Illinois Press.

Coulson, S., & Oakley, T. (2000). Blending basics. *Cognitive Linguistics, 11*(3–4), 175–196.

Fauconnier, G., & Turner, M. (1998). Conceptual integration networks. *Cognitive Science, 22*(2), 133–187. https://doi.org/10.1207/s15516709cog2202_1

Fauconnier, G., & Turner, M. (2002). *The way we think: Conceptual blending and the mind’s hidden complexities*. Basic Books.

Forceville, C. (1996). *Pictorial metaphor in advertising*. Routledge.

Gavins, J., & Steen, G. (Eds.). (2003). *Cognitive poetics in practice*. Routledge.

Gentner, D. (1983). Structure-mapping: A theoretical framework for analogy. *Cognitive Science, 7*(2), 155–170.

Grady, J. (1997). *Foundations of meaning: Primary metaphors and primary scenes* [Doctoral dissertation, University of California, Berkeley].

Grady, J., Oakley, T., & Coulson, S. (1999). Blending and metaphor. In R. W. Gibbs & G. J. Steen (Eds.), *Metaphor in cognitive linguistics* (pp. 101–124). John Benjamins.

Johnson, M. (1987). *The body in the mind: The bodily basis of meaning, imagination, and reason*. University of Chicago Press.

Knudsen, S. (2003). Scientific metaphors going public. *Journal of Pragmatics, 35*(8), 1247–1263.

Kövecses, Z. (2010). *Metaphor: A practical introduction* (2nd ed.). Oxford University Press.

Lakoff, G. (1993). The contemporary theory of metaphor. In A. Ortony (Ed.), *Metaphor and thought* (2nd ed., pp. 202–251). Cambridge University Press.
Lakoff, G., & Johnson, M. (1980). *Metaphors we live by*. University of Chicago Press.
Lakoff, G., & Turner, M. (1989). *More than cool reason: A field guide to poetic metaphor*. University of Chicago Press.
Leatherdale, W. H. (1974). *The role of analogy, model and metaphor in science* [as cited in Merakchi, 2020; please verify the full bibliographic details before submission].
Merakchi, K. (2020). *The translation of metaphors in popular science from English into Arabic in the domain of astronomy and astrophysics* [Doctoral thesis, University of Surrey]. University of Surrey Open Research. https://openresearch.surrey.ac.uk/esploro/outputs/doctoral/The-translation-of-metaphors-in-popular/99513136102346
NASA Webb Mission Team. (2024a, July 12). *Vivid portrait of interacting galaxies marks Webb's second anniversary*. NASA Science. https://science.nasa.gov/missions/webb/vivid-portrait-of-interacting-galaxies-marks-webbs-second-anniversary/
NASA Webb Mission Team. (2024b, October 1). *Webb researchers discover lensed supernova, confirm Hubble tension*. NASA Science. https://science.nasa.gov/blogs/webb/2024/10/01/webb-researchers-discover-lensed-supernova-confirm-hubble-tension/
NASA Webb Mission Team. (2026a, February 25). *NASA's Webb examines Cranium Nebula*. NASA Science. https://science.nasa.gov/missions/webb/nasas-webb-examines-cranium-nebula/
NASA Webb Mission Team. (2026b, July 2). *NASA's Webb reveals stars sparking to life in cosmic celebration*. NASA Science. https://science.nasa.gov/missions/webb/nasas-webb-reveals-stars-sparking-to-life-in-cosmic-celebration/
NASA Webb Mission Team. (2026c, August 10). *Lion Nebula roars to life with NASA's Webb*. NASA Science. https://science.nasa.gov/missions/webb/lion-nebula-roars-to-life-with-nasas-webb/
Pragglejaz Group. (2007). MIP: A method for identifying metaphorically used words in discourse. *Metaphor and Symbol, 22*(1), 1–39.
Semino, E. (2008). *Metaphor in discourse*. Cambridge University Press.
Semino, E., & Culpeper, J. (Eds.). (2002). *Cognitive stylistics: Language and cognition in text analysis*. John Benjamins.
Steen, G. J., Dorst, A. G., Herrmann, J. B., Kaal, A. A., Krennmayr, T., & Pasma, T. (2010). *A method for linguistic metaphor identification: From MIP to MIPVU*. John Benjamins.
Stockwell, P. (2002). *Cognitive poetics: An introduction*. Routledge.