

Reading the Sky, Documenting the Word: Methodological Intersections of Cultural Astronomy and Linguistic Fieldwork

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Abstract:

This review examines the methodological intersections between cultural astronomy and linguistic fieldwork, arguing that these disciplines share foundational epistemological and practical commitments that remain undertheorized as a unified research program. Cultural astronomy, encompassing archaeoastronomy and ethnoastronomy, investigates how human societies perceive, interpret, and operationalize celestial phenomena. Linguistic fieldwork documents languages through systematic observation, elicitation, and recording within community contexts. Despite parallel development and shared reliance on ethnographic methods, these fields often proceed in isolation, overlooking synergies that emerge when the sky is approached as a semantic domain and language is recognized as a repository of astronomical knowledge. Drawing on recent scholarship in semantic typology, linguistic relativity, and Indigenous astronomy, this review identifies three primary points of convergence: (1) shared ethnographic commitments to community engagement and ethical knowledge production; (2) complementary elicitation techniques for documenting celestial terminology, narrative, and grammatical features; and (3) the co-constitutive relationship between linguistic categories and astronomical cognition, evidenced in event-based time systems, absolute spatial reference, and evidential marking. The Ethiopian Mekdes case and the Bororo ethnography illustrate how celestial phenomena authorize speech acts and structure social organization. The review concludes that an integrated methodological framework would enhance both fields by treating celestial vocabulary as linguistic data and grammatical categories as astronomical evidence, while centering Indigenous data sovereignty and the right to withhold knowledge. Such integration demands rigorous documentation and ethical accountability to knowledge-holding communities.

Keywords:

cultural astronomy; linguistic fieldwork; semantic typology; Indigenous data sovereignty; celestial cognition

I. Introduction

The study of how human societies relate to the night sky has undergone a profound transformation over the past half-century. What began as archaeoastronomy—the measurement of structural alignments with celestial bodies has gradually expanded into cultural astronomy, a broad interdisciplinary field encompassing archaeological, historical, and ethnographic approaches to human-sky relationships (Holbrook, 2012; Ruggles, 2015). Holbrook (2012) defines cultural astronomy broadly as "the study of the relationship between humans and the sky," and adopts Campion's more precise formulation: the use of astronomical knowledge, beliefs, or theories to inspire, inform, or influence social forms and ideologies, or any aspect of human behavior. This definition repositions astronomy from a natural science to a cultural

practice, providing an epistemological foundation for linguistic intervention (Holbrook, 2012; Boutsikas et al., 2021).

In parallel, linguistic fieldwork has evolved from a primarily descriptive enterprise focused on grammar and lexicon into a reflexive, community-engaged practice increasingly attentive to language documentation, revitalization, and the ethical dimensions of knowledge extraction (Sakel & Everett, 2012; Thieberger, 2012). One marker of this transformation is the critical reflection on the "data extraction model." Damjanovic (2026) explicitly proposes "beyond data extraction" in the REFLECT workshop, arguing for understanding fieldwork as a "relational, ethically positioned practice" between researchers and participants. Similarly, methodological reflections from the Cypriot Arabic research project distinguish between "macro-ethics" (procedural ethics committee approval and professional guidelines) and "micro-ethics" (ethical dilemmas emerging in everyday situations), noting that the former alone is insufficient to address the concrete ethical challenges that arise in the field (Kubanyiova, 2025).

Despite these parallel trajectories, cultural astronomy and linguistic fieldwork have rarely been theorized as methodologically interconnected (Holbrook, 2012; Goshu and Ridwan. 2026). This gap is puzzling, given that both fields frequently operate in the same communities, employ the same core techniques (semi-structured interviews, participant observation, elicitation), and confront the same epistemological challenges; concerning translation, interpretation, and the limits of cross-cultural representation (Sakel & Everett, 2012; Sparavigna & Marazzato, 2023). The sky, after all, is a domain that every human language must encode in some fashion, whether through terms for celestial bodies, temporal reckoning systems, navigational practices, or narrative traditions (Da Silva Sinha, 2018; Goshu and Ridwan. 2026). Holbrook's (2012) dedicated chapter on "Cultural Astronomy for Linguists" in *The Oxford Handbook of Linguistic Fieldwork* exists precisely because she observes that "the field of cultural astronomy is currently dominated by astronomers," while linguists are "insufficiently aware" of astronomy as a fieldwork topic. This observation constitutes the starting point of the present review.

This review argues that the methodological intersections between cultural astronomy and linguistic fieldwork are not incidental but foundational (Holbrook, 2012; Goshu and Ridwan. 2026). By examining recent scholarship at this interface, I identify three areas of convergence: shared ethnographic commitments (Fabian, 1992; Sakel & Everett, 2012), complementary elicitation methods (Holbrook, 2012; Tukano et al., 2019), and the theoretical implications of linguistic relativity for celestial cognition (Whorf, 1956; Da Silva Sinha, 2018). I then consider the ethical and political dimensions of integrated research, particularly regarding Indigenous data sovereignty and the risk of extractive practices (NHMRC, 2018; Damjanovic, 2026). The review concludes by proposing directions for a more deliberately integrated research program.

1.1 Shared Ethnographic Foundations

a. Defining the Fields

Cultural astronomy, in its contemporary usage, encompasses both archaeoastronomy and ethnoastronomy. Holbrook (2008) notes that while archaeoastronomy traditionally studies "the knowledge, interpretations, and practices of ancient cultures regarding celestial objects or phenomena," and ethnoastronomy examines equivalent phenomena among "contemporary cultures," the distinction has blurred considerably since the early 1990s. Archaeoastronomy now refers more broadly to "a set of methods for measuring alignments of built and modified structures and landscapes to celestial bodies, whether the people are living or dead" (Holbrook, 2008, p. 1). The unifying thread, as Holbrook (2008) succinctly puts it, is that cultural astronomy

is simply "the study of people and the sky" (p. 1). This framing positions cultural astronomy firmly within the anthropological tradition. Iwaniszewski (2010) argues that the sky cannot be treated as a "neutral or meaningless category" external to human societies; rather, "the meaning of the sky does not exist in itself, but it is revealed through human motivations and practices" (p. 25). The researcher is therefore obligated to bracket out their own cosmological assumptions and approach celestial knowledge as culturally situated (Iwaniszewski, 2010; Holbrook, 2012). This is particularly significant for linguistic fieldwork, because astronomical concepts are embedded in linguistic structures in ways that demand the researcher's critical awareness of their own conceptual categories (Holbrook, 2012; Goshu and Ridwan, 2026).

Linguistic fieldwork is similarly defined by its ethnographic orientation. Sakel and Everett (2012) characterize it as "the activity of a researcher systematically analysing parts of a language, usually other than one's native language and usually within a community of speakers of that language" (p. 1). The methods are recognizably ethnographic: text recording, elicitation, transcription, participant observation, and analysis of naturally occurring speech (Sakel & Everett, 2012; Thieberger, 2012). The qualitative research tradition that informs linguistic fieldwork emphasizes prolonged engagement, attention to the researcher's own positionality, and recognition that meaning is co-constructed during interaction between researcher and researched (Sakel & Everett, 2012; Kubanyiova, 2025). As Wardell (2025) observes, ethnographers must be "participant listeners" as much as participant observers, gathering data through "talking to people, asking questions, and interpreting what they hear through an ethnographic lens" (p. 92).

b. The Interview as Shared Technology

The semi-structured interview constitutes perhaps the most obvious methodological bridge between the two fields. In linguistic fieldwork, interviews and elicitation sessions are the primary means of gathering grammatical and lexical data (Sakel & Everett, 2012; Thieberger, 2012). In cultural astronomy, interviews with knowledge holders; elders, ritual specialists, navigators, farmers—serve as the central method for accessing astronomical knowledge that is rarely documented in written form (Holbrook, 2012; Sparavigna & Marazzato, 2023). Both fields recognize that these encounters are not neutral data-extraction events but social encounters in which "participants' sharing is dependent on many contextual and relational factors and in which meaning is co-constructed" (Kubanyiova, 2025, p. 18).

The parallels extend to practical technique. Sakel and Everett's (2012) discussion of "teacher" selection, consent procedures, and reimbursement applies equally to cultural astronomy fieldwork (Holbrook, 2012; Sparavigna & Marazzato, 2023). Similarly, the ethnographic caution against relying on a single informant and the importance of cross-checking data are common concerns (Sakel & Everett, 2012; Fabian, 1992). A framework for preserving Aboriginal astronomy in Australia, for instance, proposes a staged approach beginning with desk-based literature review, proceeding to semi-structured interviews with Elders, and emphasizing ongoing community consultation, a methodology that would be immediately recognizable to any field linguist (Holbrook, 2008; Sparavigna & Marazzato, 2023).

c. Reflexivity and Positionality

Both fields have increasingly embraced reflexivity as a methodological virtue. Iwaniszewski (2010) acknowledges that "there can be no question of the 'proof' of any particular claim about the cosmos, only an investigation of what it is to be human" (p. 30). This echoes the linguistic fieldworker's awareness that data collection is always mediated by relationships, power dynamics, and the researcher's own theoretical commitments (Sakel & Everett, 2012; Damjanovic, 2026).

The Wiradjuri astronomy project offers a particularly candid account of these challenges. The researcher describes learning "who not to talk to as much as who I should talk to," navigating personal politics within the community, and accepting that some knowledge would be shared only in cryptic form, leaving him to decipher its meaning through subsequent conversations (Holbrook, 2008; Sparavigna & Marazzato, 2023). Positionality, as recent methodological discussions emphasize, "goes beyond researchers acknowledging their own or their host culture's values" and involves "critically examining their unfolding interactions" (Kubanyiova, 2025, p. 22). In linguistic fieldwork, researchers with plurilingual and migrant backgrounds have documented how insider/outsider positioning shapes access, interpretation, and ethical dilemmas throughout the research process (Kubanyiova, 2025; Damjanovic, 2026). Such reflexive honesty about the limits of access and the ethical boundaries of research is increasingly recognized as central to both disciplines rather than as a peripheral concern (Damjanovic, 2026; Kubanyiova, 2025).

II. Review of Literatures

2.1 Celestial Lexicon as Linguistic Data

a. Semantic Domains of the Sky

The most immediate point of intersection between cultural astronomy and linguistic fieldwork is the documentation of celestial terminology. Every language possesses some vocabulary for astronomical referents: terms for the sun, moon, planets, stars, constellations, the Milky Way, eclipses, and other phenomena (Goshu and Ridwan, 2026). Yet the boundaries of these categories vary considerably across languages, making them ideal objects of semantic typological investigation.

Semantic typology "the comparative study of linguistic categorization" across languages, provides a methodological framework for this work (Bohnemeyer et al., 2007, as cited in Goshu and Ridwan, 2026). Celestial lexical fields are particularly tractable for typological comparison because they involve "a finite, perceptually accessible set of referents" while exhibiting "considerable cross-linguistic diversity in how these referents are categorised" (Goshu and Ridwan, 2026, p. 3). Some languages lack a generic term for "star" altogether, lexicalizing only specific constellations or prominent stars. Others subsume planets under the category of "wandering stars," as in the Greek *planetai asteres* (Goshu and Ridwan, 2026). The Proto-Indo-European term for "moon," **meHnot-*, appears to have expressed the basic idea of "measure of time," pointing to a deep-seated link between lunar cycles and temporal reckoning (Blázek, 2017, as cited in Goshu and Ridwan, 2026).

Table 1 illustrates the cross-linguistic variation in celestial categorization, drawing on data from the semantic typology literature.

Table 1. Cross-Linguistic Variation in Celestial Lexical Categories

Celestial Domain	Variation Dimension	Examples
Stars	Generic term presence/absence	English <i>star</i> ; some languages lack generic term, lexicalizing only constellations (Goshu and Ridwan, 2026)

Planets	Inclusion/exclusion from "star" category	Greek <i>planetai asteres</i> ("wandering stars"); English distinguishes star/planet (Goshu and Ridwan, 2026)
Constellations	Recurrent semantic parallels	Pleiades: "basket/sieve," "numerous," "seven stars" across Northern Eurasia (Blázquez, 2017, as cited in Goshu and Ridwan, 2026)
Lunar Phases	Number of named phases	Some distinguish only new/full; others up to eight distinct phases (Goshu and Ridwan, 2026)
Moon	Semantic motivation	Proto-Indo-European <i>*meHnot-</i> = "measure of time" (Blázquez, 2017, as cited in Goshu and Ridwan, 2026)

b. Linguistic Relativity and Celestial Cognition

The Sapir-Whorf hypothesis provides a theoretical framework for understanding why celestial vocabulary matters beyond mere description. Whorf (1940/1956) argued that "all observers are not led by the same physical evidence to the same picture of the universe, unless their linguistic backgrounds are similar" (p. 214, as cited in Goshu and Ridwan, 2026). While the strong version of linguistic determinism that language rigidly constrains thought has been largely abandoned due to lack of empirical support (Evans, 2010, as cited in Goshu and Ridwan, 2026), the weak version that language influences habitual patterns of attention, memory, and reasoning has generated a productive research program (Gumperz & Levinson, 1996; Goshu and Ridwan, 2026).

Celestial domains offer three particularly fertile areas for testing weak relativity effects. First, celestial time reckoning: research on three Brazilian Indigenous languages (Huni Kui, Awety, and Kamaiura) found no lexical equivalents for "time" as an abstract noun; instead, temporal reference was indexed directly by "celestial bodies (sun, moon and stars) and activities" (Da Silva Sinha, 2018, p. 9, as cited in Goshu and Ridwan, 2026). Second, celestial direction: many languages employ absolute spatial frames of reference anchored to celestial bodies, with speakers of certain Australian Aboriginal languages using cardinal directions guided by the sun's arc even indoors (Levinson, 2003, as cited in Goshu and Ridwan, 2026). Third, celestial causality: languages with obligatory evidential marking, such as Tariana (Arawak) and Tuyuca, require speakers to specify the source of knowledge about celestial events, potentially constraining causal explanations of phenomena like eclipses (Evans, 2010, as cited in Goshu and Ridwan, 2026). Quechua evidential systems similarly encode the speaker's information source in ways that shape epistemological orientations (Nuckolls, 1993; Floyd, 1993).

Figure 1 presents a conceptual model of the tripartite relationship between linguistic categories, celestial cognition, and astronomical practice.



Figure 1. *Linguistic Relativity and Celestial Cognition: A Conceptual Model*

These findings suggest that documenting celestial vocabulary is not merely a lexicographic exercise but a contribution to understanding how language shapes human engagement with the sky (Goshu and Ridwan, 2026; Gumperz & Levinson, 1996).

c. Elicitation Strategies for Celestial Domains

The practical challenge for fieldworkers is developing elicitation strategies that can access celestial knowledge without imposing Western astronomical categories. The prototype interview guide developed for Aboriginal astronomy in South East Queensland offers a model of culturally sensitive questioning (National Health and Medical Research Council, 2018; CSIRO, 2024). Rather than asking directly about "astronomy," the guide opens with broad questions: "Can you share what the night sky means to you and your community, both in the past and today?" It then moves to specific celestial referents, relationships between sky and Country, special events like eclipses, and the transmission of knowledge across generations (CSIRO, 2024).

This approach recognizes that celestial knowledge is often embedded in narrative, ritual, and practical activity rather than abstracted as a separate domain. The Tukano workshops in the Brazilian Amazon illustrate a complementary strategy: rather than extracting star names through direct elicitation, researchers facilitated workshops in which participants constructed "circular calendars" that combined sky and terrestrial seasonal indicators (Cardoso, 2017, as cited in Tukano et al., 2019). These material objects served both as documentation tools and as heuristic devices that made celestial knowledge visible in its integrated form.

Table 2 synthesizes the elicitation strategies identified in the literature, organized by the type of celestial knowledge targeted and the corresponding methodological approach.

Table 2. Elicitation Strategies for Celestial Domains in Linguistic Fieldwork

Knowledge Type	Elicitation Strategy	Methodological Rationale	Source
General significance sky	Open-ended narrative prompts ("What does the night sky mean to you?")	Respects living nature of Indigenous knowledge; avoids imposing Western categories	CSIRO, 2024
Star names and constellations	Repeated observation sessions with individual knowledge holders	Cross-checks consistency; accounts for seasonal variation	Cardoso, 2017; Tukano et al., 2019
Seasonal indicators	Collaborative construction of circular calendars	Makes integrated sky-terrestrial knowledge visible	Tukano et al., 2019
Sensitive/restricted knowledge	Explicit questions about boundaries and protocols	Recognizes Indigenous data sovereignty	NHMRC, 2018; CSIRO, 2024
Intergenerational transmission	Questions about stories, songs, and art	Accesses embedded rather than abstracted knowledge	CSIRO, 2024

Astronomical terminology	Progressive elicitation from general to specific referents	Builds rapport; identifies semantic boundaries organically	Goshu and Ridwan, 2026; Cardoso, 2017
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The Tukano fieldwork further illustrates the importance of repeated observation across different nights and times. Researchers "asked more than once on different occasions to the same knowledge holder about the positions of constellations," occurring on different nights and times to verify whether "the constructed images coincided with those that had been pointed out on previous nights" (Cardoso, 2017, as cited in Tukano et al., 2019). This iterative approach to elicitation aligns with both linguistic fieldwork best practices (Sakel & Everett, 2012) and cultural astronomy's emphasis on phenomenological validity (Iwaniszewski, 2010).

The methodological convergence identified here suggests that celestial lexicon documentation should proceed through staged, community-engaged processes that prioritize open-ended questioning, repeated observation, and explicit attention to knowledge sovereignty (NHMRC, 2018; CSIRO, 2024; Goshu and Ridwan, 2026).

III. Research Methods

3.1 Astronomical Knowledge as Linguistic Evidence

a. Language as a Historical Record of Sky Knowledge

Just as celestial vocabulary requires linguistic methods for its documentation, linguistic data can serve as evidence for astronomical knowledge that might otherwise leave no material trace. The Armenian case is instructive. The traditional Armenian name for the Milky Way, *Hardagoghichanaparh*, translatable as "the Way of the Straw Thief", preserves a mythological narrative in which the hero Vahagn steals straw from an Assyrian king and scatters it across the sky (Shirakatsi, 1979/7th century CE; Goshu and Ridwan, 2026). A similar association between the Milky Way and straw appears in Assyrian Neo-Aramaic (*shvil tivna*, "the way of straw"; *urba d'gannave*, "the path of thieves"), suggesting either shared cultural inheritance or convergent symbolic interpretation (Goshu and Ridwan, 2026).

The Armenian scholar Anania Shirakatsi (610–685 CE) mentioned both the traditional name and the mythological narrative in his writings, while simultaneously offering a scientific explanation: the Milky Way consists not of straw but of countless stars (Shirakatsi, 1979/7th century CE). In his *Cosmography*, Shirakatsi recorded multiple folk names for the Milky Way alongside his rational explanation, including *Vardagol* (the straw-thief) and *Kart-ciranagol* (the cataract of the empyrean) (Shirakatsi, 1979/7th century CE). He explicitly stated that "all this is not real, for it is condensed fire and the reflection of light from small stars" (Shirakatsi, 1979/7th century CE, as cited in Goshu and Ridwan, 2026, p. 12). This example demonstrates how linguistic evidence can preserve astronomical knowledge across millennia, even as scientific understanding evolves. The very multiplicity of folk names, drawn from agricultural practice, mythology, and phenomenology, reveals the layered nature of astronomical knowledge within a single cultural tradition (Goshu and Ridwan, 2026).

Table 3 illustrates the comparative documentation of Milky Way names across cultures, demonstrating the recurring symbolic motifs that linguistic fieldwork can recover.

Table 3. Comparative Documentation of Milky Way Names and Associated Motifs

Culture/Language	Name for Milky Way	Literal Meaning	Associated Motif	Source
Armenian	<i>Hardagoghichanaparh / Vardagol</i>	"Way of the Straw Thief"	Vahagn steals straw from Assyrian king	Shirakatsi, 1979/7th century CE; Goshu and Ridwan, 2026
Assyrian Neo-Aramaic	<i>shvil tivna / urba d'gannave</i>	"Way of straw" / "Path of thieves"	Straw theft narrative	Goshu and Ridwan, 2026
Finnic/Baltic	<i>Linnunrata / Paukščiņ Takas</i>	"Pathway of the Birds"	Migratory birds use galaxy as guide	Goshu and Ridwan, 2026
Greek	<i>Galaxias</i>	"Milky"	Hera's milk spurts across sky	Goshu and Ridwan, 2026
Hungarian	<i>Hadak Útja</i>	"Road of the Warriors"	Prince Csaba rides down galaxy	Goshu and Ridwan, 2026
Irish	<i>Bealach na Bó Finne</i>	"Way of the White Cow"	Heavenly reflection of River Boyne	Goshu and Ridwan, 2026
Cherokee	<i>Gili Uliṣṣdamyi</i>	"Where the dog ran"	Dog spills cornmeal while fleeing	Goshu and Ridwan, 2026
Chinese	<i>Yínhé</i>	"Silvery River"	Heavenly river separating lovers	Goshu and Ridwan, 2026

Figure 2 reveals four recurrent semantic motifs in Milky Way naming—agricultural, animal, mythological, and military, demonstrating that celestial lexicon encodes culturally specific ecological and narrative knowledge (Goshu and Ridwan, 2026). The Armenian and Assyrian "Straw/Thief" motif preserves mythological narratives of stolen grain, while Cherokee "Cornmeal/Dog" reflects agricultural practice. Finnic and Baltic "Birds' Path" is particularly significant, as it encodes empirical observation: migratory birds genuinely navigate using the Milky Way (Goshu and Ridwan, 2026). This convergence of symbolic and empirical knowledge illustrates how linguistic fieldwork recovers astronomical understanding that material evidence alone cannot preserve (Holbrook, 2012; Shirakatsi, 1979/7th century CE). Such motifs demonstrate weak linguistic relativity effects, wherein lexical categories shape habitual attention to celestial phenomena (Goshu and Ridwan, 2026).



Figure 2. Comparative semantic motifs in Milky Way naming across eight cultural traditions.

b. Celestial Categories and Grammatical Structure

The relationship between linguistic categories and astronomical cognition extends beyond lexicon to grammar and pragmatics. Goshu and Ridwan (2025) demonstrate that in Ethiopian highland communities, the heliacal rising of the Pleiades (*Bakkalcha*) marks the transition from polite caution to permissible reproach in the speech act of *Mekdes* (loyal reproach). Star names encode moral pedagogy: *Saddu* (unity), *Gulshan* (revelation), *Gabbiya* (accountability) are not merely astronomical labels but ethical categories that inform ritual speech (Goshu & Ridwan, 2025). The study proposes the concept of "celestial diglossia"—a functional split between priestly and farmer-level astronomical registers that parallels linguistic diglossia and authorizes *Mekdes* through distinct channels (Goshu & Ridwan, 2025).

This case illustrates how grammatical and pragmatic features of language may be systematically related to astronomical knowledge. The stars provide "a moral clock that tells speakers when a relationship has ripened from strangerhood to intimacy," transforming reproach from face threat into face gift (Goshu & Ridwan, 2025, p. 18). The *Mekdes* speech act is characterized by "raised volume, slower tempo, direct pronouns, and forward lean, features that signal belonging rather than threat" (Goshu & Ridwan, 2025, p. 19). Such findings suggest that linguistic fieldwork attentive to celestial references can reveal dimensions of astronomical knowledge that a purely lexical approach would miss (Goshu & Ridwan, 2025; Goshu and Ridwan, 2026).

Table 2 synthesizes the relationship between linguistic features, celestial referents, and pragmatic functions documented in the Ethiopian case.

Table 2. Celestial Diglossia and the Moral Clock: Linguistic Features and Celestial Referents

Linguistic Level	Feature	Celestial Referent	Pragmatic Function	Source
Lexical	Star names (<i>Saddu</i> , <i>Gulshan</i> , <i>Gabbiya</i>)	Specific stars/constellations	Encode moral pedagogy	Goshu & Ridwan, 2025
Pragmatic	<i>Mekdes</i> (loyal reproach)	Heliacal rising of <i>Bakkalcha</i> (Pleiades)	Marks transition from politeness to permissible intimacy	Goshu & Ridwan, 2025

Register	Celestial diglossia	Priestly vs. farmer-level astronomical registers	Authorizes speech acts through distinct channels	Goshu & Ridwan, 2025
Temporal	"Moral clock"	Pleiades' heliacal rising	Regulates timing of face-threatening acts	Goshu & Ridwan, 2025

c. Narrative and Myth as Astronomical Data

The documentation of oral narratives serves both linguistic and astronomical purposes simultaneously. When a Wiradjuri Elder shares a story about the sky, that narrative is simultaneously a linguistic performance, a cosmological statement, and a culturally situated form of knowledge transmission (Holbrook, 2012; CSIRO, 2024). The linguistic fieldworker transcribes and analyzes it as grammatical and discourse data; the cultural astronomer interprets it for celestial references and cosmological content (Holbrook, 2012; Goshu and Ridwan, 2026).

The Bororo of Brazil offer a well-documented example. Fabian's (1992) ethnography argues that ethnoastronomical knowledge is "not merely a metaphor for Bororo social processes, rather it is integral to their mediation between natural and social realms" (Fabian, 1992, p. 7). Most importantly, it demonstrates "the layering of ethnoastronomical knowledge into complex webs of temporal devices, most of which are terrestrial cycles such as flowering of plants, rainfall, and animal activities" (Fabian, 1992, p. 202). Fabian's work shows how the Bororo integrate "the social, natural, and cosmic dimensions of time and space into their environment," with the circular village structure itself acting as "a retrieval and classification system that functions much as lists or tables would in a literate society" (Fabian, 1992, p. 145).

The Bororo case further illustrates the integration of narrative and astronomical observation. Fabian's (1992) ethnography opens with a version of the Bororo bird-nester myth that "alludes to the spatial dimensions that govern Bororo village organization" (Fabian, 1992, p. 3). The myth is not merely entertainment but a cosmological charter that maps social structure onto celestial order. As one reviewer notes, Fabian "convincingly argues that the Bororo possessed a definite knowledge of space and time passage although they do not have the exact words to express this concept" (Fabian, 1992, p. 178). This observation is crucial for linguistic fieldworkers: the absence of abstract terminology for "time" or "space" does not indicate absence of the concepts themselves, but rather their encoding through alternative linguistic and cultural means (Fabian, 1992; Da Silva Sinha, 2018).

Figure 3 presents a model of the layered relationship between narrative, celestial observation, and social structure in the Bororo case.

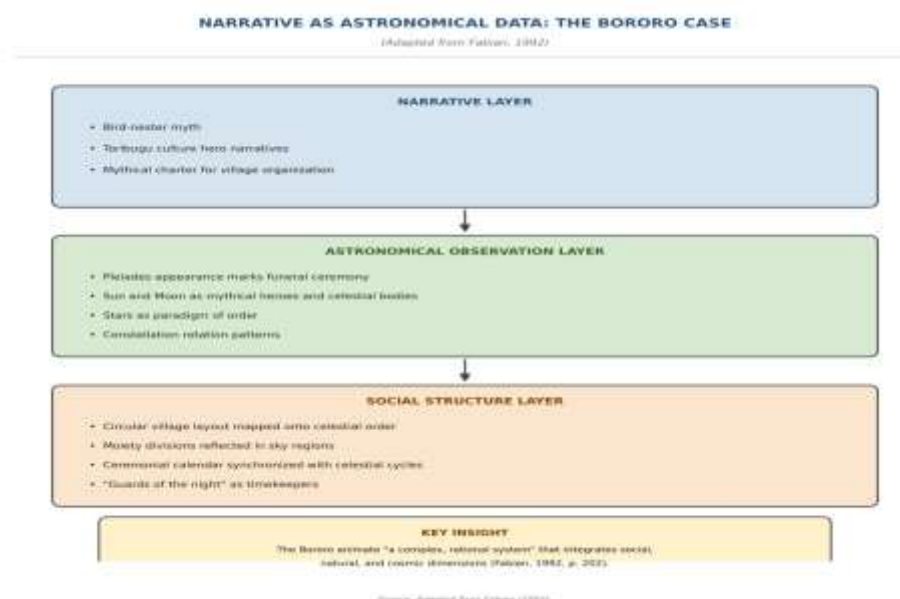


Figure 3. Layered model of Bororo narrative, astronomy, and social structure (Fabian, 1992).

Figure 3 models the layered relationship between narrative, astronomical observation, and social structure among the Bororo of Brazil, demonstrating that oral tradition functions as astronomical data rather than mere metaphor (Fabian, 1992). The Narrative Layer, comprising the bird-nester myth and Toribugu hero narratives, provides a mythical charter for village organization. This feeds directly into the Astronomical Observation Layer, where the Pleiades' appearance marks funeral ceremonies and stars serve as a paradigm of order (Fabian, 1992). These observations, in turn, structure the Social Structure Layer: the circular village layout maps onto celestial order, moiety divisions reflect sky regions, and ceremonial calendars synchronize with celestial cycles. Fabian (1992) argues the Bororo animate "a complex, rational system" integrating social, natural, and cosmic dimensions, confirming that linguistic documentation of narrative recovers astronomical knowledge inaccessible through material evidence alone (Holbrook, 2012).

The Barasana of Northwest Amazonia offer a parallel case. Hugh-Jones's (1979) study of the *He* initiation rite demonstrates how the Pleiades and other celestial bodies are woven into ritual cosmology. The secret men's cult analyzed by Hugh-Jones (1979) involves "a general picture of a South American Indian society and of a religious and cosmological system that is common to a large area of Northwest Amazonia" (Hugh-Jones, 1979, p. 1). The Pleiades mark the transition from dry to wet season, and the shamanic figure Romi Kumu ("Woman Shaman") is identified with the Pleiades, fire, and the deluge (Hugh-Jones, 1979). Documenting these layered relationships requires linguistic competence in the community's language, familiarity with its narrative traditions, and the ethnographic skill to observe how astronomical references are deployed in everyday life and ritual practice (Hugh-Jones, 1979; Fabian, 1992).

The methodological implication is clear: narrative documentation in linguistic fieldwork should attend explicitly to celestial references, treating them not as incidental imagery but as potential astronomical data (Holbrook, 2012; Goshu and Ridwan, 2026). Conversely, cultural astronomy fieldwork should record narratives in their original linguistic form, recognizing that translation into a metropolitan language inevitably transforms the semantic and pragmatic dimensions of astronomical knowledge (Fabian, 1992; Goshu & Ridwan, 2025).

IV. Result and Discussion

4.1 Ethical and Political Dimensions

a. Indigenous Data Sovereignty

The integration of cultural astronomy and linguistic fieldwork raises urgent questions about who controls the resulting knowledge. The Wiradjuri researcher describes a situation in which “some material shared with me cannot be disclosed because the knowledge is secret or because the Elder chose not to sign a PISC [Participant Information and Consent Statement] for that specific knowledge” (CSIRO, 2024, p. 12). One Cultural Advisor expressed relief that the researcher had not covered “Law, and secret-sacred business in too much depth,” leaving it to Elders to pass on knowledge “the proper way” (CSIRO, 2024, p. 14). This required “walking a fine line between working with Wiradjuri Elder’s knowledge communicated with me for the research and leaving some secret-sacred knowledge for the Elders use only” (CSIRO, 2024, p. 15).

Such ethical negotiation is not peripheral to methodology but constitutive of it. The framework for preserving Aboriginal astronomy in South East Queensland emphasizes that research “requires a deeply respectful and culturally sensitive approach that prioritizes Indigenous voices and protocols” (CSIRO, 2024, p. 8). The prototype interview guide includes explicit questions about “aspects of sky knowledge that are considered sensitive or restricted” and “the most appropriate ways for non-Indigenous people to learn about and appreciate your sky knowledge” (CSIRO, 2024, p. 11). These are not afterthoughts but foundational methodological commitments.

The CARE Principles for Indigenous Data Governance provide a systematic framework for operationalizing these commitments. Carroll et al. (2020) articulate four core principles: Collective Benefit, Authority to Control, Responsibility, and Ethics. These principles extend beyond the FAIR principles (Findable, Accessible, Interoperable, Reusable) by centering Indigenous peoples’ rights to govern the collection, use, and dissemination of data derived from their knowledge systems (Carroll et al., 2020; Imperial College London, 2026). For research at the intersection of cultural astronomy and linguistic fieldwork, CARE principles demand that communities retain authority over celestial knowledge even when it is documented through linguistic elicitation or astronomical analysis. The concept of Indigenous data sovereignty, as elaborated by Carroll et al. (2019), emphasizes that data governance must serve community-defined purposes rather than merely satisfying academic requirements.

b. Language Documentation as Astronomical Documentation

For communities whose languages are endangered, the documentation of celestial vocabulary and narrative is simultaneously language revitalization and cultural astronomy. The IAU Catalog of Star Names has recently incorporated names reflecting diverse cultural traditions, including Chinese, Arabic, \Xam (Khoe/San), Dayak, Marshallese, Sami, and other non-Western astronomical heritages (IAU, 2026). While this represents progress toward recognizing Indigenous astronomical knowledge, it also raises questions about appropriation and the commodification of traditional star names. The IAU Working Group on Star Names acknowledges that “in several cases, this led to the intentional postponement of naming decisions where additional scholarly work is required,” particularly regarding Indigenous naming traditions of the southern hemisphere (IAU, 2026, para. 6).

The framework for Aboriginal astronomy suggests a more substantive approach: research should “support cultural continuity and the revitalization of knowledge for future generations”

(CSIRO, 2024, p. 10). This positions documentation not as extraction for academic purposes but as a resource for community-controlled education and cultural maintenance. Goto (2017) similarly argues that astronomical anthropology should participate actively in revitalizing Indigenous astronomy as a form of practical knowledge, not merely recording “past and endangered customs.” Goto’s research with Ainu astronomical knowledge in Hokkaido demonstrates this approach through planetarium programming that presents Indigenous starlore as living knowledge rather than historical artifact (Goto, 2019). The project explicitly aimed to present anthropological knowledge not only for academic audiences but for citizens, practicing what Goto terms “neo-science”; the integration of ethnoscience and science (Goto, 2017). This participatory model positions documentation as a resource for community education and cultural continuity, aligning with the beneficence and justice principles that Kubanyiova (2025) identifies as frequently neglected in applied linguistics research.

c. The Risk of Extractivism

The methodological convergence of cultural astronomy and linguistic fieldwork carries inherent risks. Both fields have histories of extractive research in which knowledge was appropriated for academic careers without meaningful benefit to source communities (Kubanyiova, 2025; CSIRO, 2024). The integration of the two could intensify these dynamics by making communities doubly vulnerable, as sources of both linguistic and astronomical data.

Kubanyiova’s (2025) distinction between “macroethics” (procedural ethics and professional codes) and “microethics” (everyday ethical dilemmas arising in specific research contexts) is particularly relevant here. She notes that “while the principle of respect for persons is generally routinely adhered to, there has been a notable neglect of the principles of beneficence and justice” in applied linguistics research (Kubanyiova, 2025, p. 8). Beneficence, ensuring research benefits the communities studied has often been implicitly assumed rather than explicitly documented, while justice, fair distribution of research benefits has been consistently overlooked (Kubanyiova, 2025). For integrated cultural astronomy and linguistic fieldwork, these principles demand explicit attention: What does the community gain from having its celestial vocabulary documented? How will the research contribute to language revitalization and astronomical knowledge transmission?

Mitigating these risks requires structural changes in how research is designed, funded, and disseminated. The Wiradjuri researcher notes being “hampered with a lack of funding to support more extensive fieldwork,” which limited the depth of community engagement (CSIRO, 2024, p. 16). Funding structures that prioritize short-term data collection over long-term relationship building perpetuate extractive dynamics. Conversely, methodologies that center community priorities, such as the prototype tools developed through co-design processes—point toward more equitable models (CSIRO, 2024). The Helsinki workshop on Indigenous Studies methodologies identifies “today’s academic structures” as a barrier against sustainable research, citing “finances, authorship and accessibility” as persistent obstacles to reciprocal relationships (University of Helsinki, 2025). As Damjanovic (2026) argues, moving “beyond data extraction” requires reconceiving fieldwork as a “relational, ethically positioned practice” in which researchers’ accountability extends beyond institutional requirements to the communities themselves.

4.2 Toward an Integrated Methodology

a. Practical Recommendations

The intersections identified in this review suggest several practical recommendations for researchers working at the interface of cultural astronomy and linguistic fieldwork.

First, celestial vocabulary should be documented with the same rigor as other semantic domains, including attention to category boundaries, metaphorical extensions, and grammatical behavior. Semantic typology provides a rigorous framework for cross-linguistic comparison, eliciting preferred descriptions in multiple languages through standardized non-linguistic stimuli (images, videos, toys) that reveal cross-linguistic patterns of conceptual distinction (Bohnemeyer, 2011). As Bohnemeyer (2011) argues, "cataloging the semantic categories of the world's languages is an indispensable component of the core project of cognitive science"; namely, determining which aspects of cognition are biologically determined and which are culturally constructed. Celestial domains are particularly well suited to such analysis because they involve a finite, perceptually accessible set of referents while exhibiting considerable cross-linguistic diversity (Goshu and Ridwan, 2026).

Second, elicitation strategies should begin with open-ended questions about the sky's significance, rather than imposing Western astronomical categories. The semi-structured interview guide developed for Aboriginal astronomy in South East Queensland offers a model, opening with the question, "Can you share what the night sky means to you and your community, both in the past and today?" before moving to specific celestial referents, relationships between sky and Country, and knowledge transmission (CSIRO, 2024). The guide explicitly asks whether "there are aspects of sky knowledge that are considered sensitive or restricted," embodying a fundamental respect for knowledge sovereignty (CSIRO, 2024, p. 11).

Third, celestial narratives should be documented as both linguistic and astronomical data, with attention to how grammatical features (evidentiality, spatial reference, temporal marking) shape astronomical expression. As Evans (2010) argues, "the differences between languages lie not in what you can say, but in what you must say", every language obliges speakers to attend to certain grammatical categories. The obligatory evidential marking of eclipse accounts in Tariana and the sun-anchored absolute spatial reference of Guugu Yimithirr are both examples of grammatical structures systematically encoding astronomical knowledge (Evans, 2010; Goshu and Ridwan, 2026).

Fourth, research should be designed in consultation with communities from the outset, with explicit agreements about knowledge sovereignty, dissemination, and benefit-sharing. The Aboriginal Astronomy Working Group emphasizes that "free, prior, and informed consent is paramount," and that such consent must be ongoing, communities may withdraw support at any time (CSIRO, 2024). Collaborative research requires Indigenous communities to be actively involved in shaping research questions, methods, and outcomes, rather than having external academic frameworks imposed upon them (CSIRO, 2024; Carroll et al., 2020). The CSIRO (2024) framework further states that research should "support cultural continuity and the revitalisation of knowledge for future generations," positioning documentation as a resource for community-controlled education and cultural maintenance.

Fifth, researchers should cultivate competence in both linguistic and astronomical domains, or work in interdisciplinary teams that collectively possess these skills. Sakel and Everett's (2012) guide to linguistic fieldwork emphasizes that methodological choices depend on research goals: writing a grammar may require using all methods, whereas studying a specific structure may require only one. However, documenting celestial vocabulary involves the systematic methods of semantic typology, domain expertise in astronomical knowledge, and ethnographic sensitivity—skills rarely concentrated in a single researcher (Bohnemeyer, 2011; Holbrook, 2012).

b. Theoretical Implications

The integration proposed here has implications beyond methodology. If linguistic categories shape celestial cognition, as the weak relativity hypothesis suggests, then documenting celestial vocabulary is not merely recording labels for pre-existing phenomena but accessing the cognitive frameworks through which communities perceive and reason about the sky (Goshu and Ridwan, 2026; Whorf, 1956). Goshu and Ridwan, (2026) research supports the applicability of a "moderate linguistic relativity hypothesis" in the domain of natural kinds: grammatical patterns shape habitual attention to celestial phenomena without determining perception.

However, the empirical basis for linguistic relativity requires careful scrutiny. Boroditsky's (2001) research on time metaphors in English and Mandarin underwent six failed replication attempts, leading the author to conclude that they "provide no evidence in support of the Whorfian hypothesis" (Chen, 2007). Au's (1989) reanalysis of Bloom's (1981) study of Chinese counterfactual reasoning similarly demonstrated that the original finding was an artifact of methodological flaws. Pepinsky (2022) more broadly argues that the statistical methodology of Whorfian socioeconomics "is prone to producing false positives." These critiques remind us that the relationship between celestial cognition and linguistic structure must be established through rigorous experimental design and multiple sources of evidence, not inferred directly from lexical differences.

At the same time, research on event-based time provides a more robust evidentiary foundation. Da Silva Sinha's (2019) study of three Brazilian Indigenous languages; Huni Kuĩ, Awetý, and Kamaiurá, demonstrates that these languages possess no lexical equivalent for "time" as an abstract noun; temporal reference is indexed directly by "celestial bodies (sun, moon and stars) and activities" (Da Silva Sinha, 2019, p. 9). The study employed a multi-method qualitative approach, including ethnographic observation, structured elicitation tasks, and interviews, collecting time interval expressions across four languages in three domains: seasons, times of day, and life stages (Da Silva Sinha, 2019). This finding suggests that research on temporal encoding in celestial domains requires methodologies that move beyond simple lexical list comparison toward systematic analysis of event structure and grammatical categories (Da Silva Sinha, 2019; Goshu and Ridwan, 2026).

Conversely, if astronomical knowledge is embedded in grammatical and pragmatic structures, as the Ethiopian Mekdes case suggests, then linguistic description that ignores celestial references misses a dimension of language use (Goshu & Ridwan, 2025, 2026). Goshu and Ridwan's (2026) research demonstrates that the Harari solar calendar divides the year into four seasons (Bayg, Kirmi/Ganna, Zirat, Jay), each further subdivided into seven menzeel periods, arithmetically confirming precise tropical year calculations. Linguistic analysis reveals a hybrid terminological system in which Arabic structural terms (*manzil*, *zirā'ah*) coexist with indigenous seasonal nomenclature (Kirmi, Jay), reflecting layered cultural contact (Goshu & Ridwan, 2026). This case illustrates that celestial vocabulary and grammatical structure together constitute the linguistic vehicle of astronomical knowledge, the two being inseparably intertwined (Goshu & Ridwan, 2026; Goshu and Ridwan, 2026).

These theoretical implications argue for treating cultural astronomy and linguistic fieldwork not as adjacent disciplines but as mutually constitutive approaches to understanding human engagement with the cosmos (Holbrook, 2012; Goshu and Ridwan, 2026). The sky is a linguistic domain; language is an astronomical instrument. Documenting one necessarily involves documenting the other (Holbrook, 2012; Fabian, 1992).

V. Conclusions

This review has examined the methodological intersections between cultural astronomy and linguistic fieldwork, arguing that these fields share foundational commitments to ethnographic engagement, community accountability, and the documentation of culturally situated knowledge. The documentation of celestial vocabulary, narrative, and grammatical features offers a productive point of convergence, one underexploited in both fields. Celestial domains, involving a finite, perceptually accessible set of referents yet exhibiting considerable cross-linguistic diversity represent an especially tractable site for semantic typological investigation.

The integration proposed here is not merely additive. Rather, it recognizes that language and astronomical knowledge are co-constitutive: language provides the categories through which the sky is perceived, while celestial phenomena shape linguistic structure and use. The Ethiopian Mekdes case demonstrates this vividly: the Pleiades' heliacal rising authorizes speech, transforming reproach into face gift through a "moral clock". The Bororo case shows ethnoastronomical knowledge is "integral to their mediation between natural and social realms". Documenting this relationship requires tools from both traditions.

Simultaneously, integration must attend to ethical and political dimensions. Extractivist histories demand methodologies centering Indigenous data sovereignty, community benefit, and the right to withhold knowledge. The CARE Principles provide a systematic framework extending beyond FAIR. The sky is not merely a research object; it is a domain of cultural significance and spiritual meaning. Its languages are living, contested, and sovereign.

The challenge is developing methodologies rigorous enough to document celestial-linguistic complexities and respectful enough to honor knowledge-holding communities. Much work remains. The sky awaits; so do the words.

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