

Transmission of Ecological Knowledge Through Star Myths

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Introduction: Definitions

- Hunter-Gatherers/Foragers: peoples who are reliant on wild resources for all or the majority of their diet
- Asterism: prominent pattern or group of stars; constellation (we also included references to individual stars, such as Polaris)
- Star myths: traditional narratives that present supernatural explanations for the origins and/or features of asterisms



Research Inspiration

- Research in ethnoastronomy indicates that early agricultural societies used changes in the positions of asterisms to
 - predict seasonal change
 - determine when to plant crops
- Research indicates that this knowledge was encoded in myth (e.g., Barber & Barber 2004)
- We wanted to know how widespread these practices are among foragers
 - How widespread are star myths?
 - How widespread is use of star myths to encode ecological information?

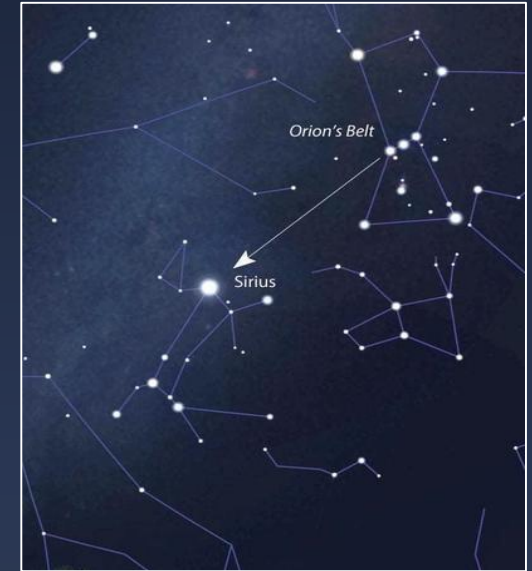


Evidence of Ecological Use of Star Lore

- Foragers use asterisms to predict seasonal change & resource availability
 - *Example: "Arawaks and Warraus ... have told me that this [Southern Cross] represents the powis [and] serves also as an indication for the hunting of the bird, Schomburgk recording how, when the cross stands erect, the powis commences its low moan" (Roth 1915:261)*
- Foragers encode this information in star myths
 - *Example: "In San mythology the stars are animals or people of earlier times; the names given to them usually represent animals that are abundantly available at the seasons that the stars are prominent" (Medupe 2015:1033-4)*
- Star myths encode information on how to locate asterisms
 - *Example: "star mythology 'maps' the celestial sphere, and through graphic narrative teaches the location of various stars and their ... relationship to each other, instruction crucial when using stars in time telling or in navigation" (MacDonald 2015:536-537)*
- Foragers use star myths as mnemonics
 - *Example: "Stars could be remembered by the legends associated with them. The people before us had no writing system so they had legends in order to remember" (MacDonald 2015:168)*

Using Stars to Predict Seasonal Change

- The presence and position of many asterisms varies across the year
 - may be visible for only part of the year
 - may rise and set at different times/places over the year
 - may be higher/lower in the sky at different times of year
- Helical rising commonly used to mark seasonal change
 - Helical rising: first appearance of an asterism on the horizon before dawn after a period of disappearance
 - *Example: “The coming of the dingo pups came earlier in Arnhem Land, and Orion rising at dawn (about June) signaled this propitious event” (Johnson 1998:25)*



Predictions

- If star myths are widely used by foragers to store and transmit ecological knowledge useful for subsistence, we would expect these myths
 - to reference asterisms that can be used for ecological purposes
 - to provide information useful for identifying and locating these asterisms
 - to provide information about these asterisms that can be used to reckon time (e.g., how long until sunrise)
 - to associate these asterisms with a given season or with seasonal change (e.g., cold season, dry season, rain, snow)
 - to provide information about these asterisms that can be used for navigation
 - to reference important seasonal plant/animal resources or plants/animals that are cues of seasonal change

Methods:

Generating the Study Sample

- We surveyed a cross-cultural sample of forager story collections for star myths
- *Ethnographic Atlas* (Murdock 1967) used to generate list of forager cultures
 - “Forager” operationalized as combined score of 7 (66-75%) or more for dependence on gathering, fishing, and/or hunting of wild resources (*Atlas* Table A, Column 7)
- *Atlas* is organized into regions of closely related cultures
 - 102 regions contain forager cultures; some regions contain multiple forager cultures (total # forager cultures in *Atlas* = 250)
 - UO library search conducted for forager story collections; collections with star myths found for 44 different forager culture regions and 82 different forager cultures
- A total of 211 narratives were coded for presence of the predicted information
 - For each region, all star myths were coded, including variants

Methods: Content Themes



DESCRIPTION

- Information useful for locating and/or identifying asterism
- Example from the Saami:
- *“if you follow the star all night long, you will see that **everything circles around it**, all the animals and stars of heaven. The hunter, the reindeer calf and the moose, the dogs and the old man, all circle round and round. Only the North Star doesn't move”*
(Kuoljok & Utsi 1993:16)

TIME

- Information about asterism's relevant period of visibility or its use for estimating time
- Example from NW Australia:
- *“each day just before dawn, Barnumbir, the morning star, appears in the sky. The other stars have fallen, so her small light shines brightly. She dances on the treetops, then she twinkles briefly on the black waters”* (Allen 1975:232)

Methods: Content Themes



algarrobo fruit



SEASONAL CHANGE

- References to season, season in which asterism is visible, or relevant season for using the asterism
- Example from the Nivaclé:
- *“They are going to be stars and everyone who sees them will call them 'Rhea Foot.' They will appear during the season that the algarrobo tree gives fruit; they will appear in summer” (Wilbert & Simoneau 1987:73)*

NAVIGATION

- References to use of asterism to orient oneself in space or reckon direction of travel
- Example from the Naskapi:
- *“he is **North Star**, and will be of good use to serve the people of the world that is to come, as a guide by night in their travels.’ So the North Star became the guide of the people” (Speck 1925:28)*

Methods: Content Themes



ANIMALS

- References to seasonal animal resources or animals that are cues of seasonal change
- Example from the Chumash:
- “now they were // no longer boys. *They were geese They flew away to the north, and [became] the seven Pleiades*” (Blackburn 1975:247-248)



PLANTS

- References to seasonal plant resources or plants that are cues of seasonal change
- Example from NW Australia:
- “When the aborigines hear the first rumblings of thunder in the summer time, they ... say to each other, ‘*The Makara [Pleiades] are bathing again Soon they will splash so much water over the edge of their bathing pool that there will be sufficient rain to fill the waterholes, and to make the yams grow*’” (Mountford 1976:35)

How the Themes Work Together

- Star myths often contain multiple types of ecological information

Example from the Wasco:

- *“And he [Coyote] put up a bunch of stars. Sometimes this bunch of stars comes up in the evening, just as the sun has set behind the mountains. In the spring, when the bow-and-arrow woods are in bloom, this bunch of stars gives luck” (Clark 1953:155)*

Study Populations: 44 Regions, 82 Cultures

AFRICA	EAST EURASIA	281 Micmac	301 Chumash	313 Piegan
2 San	155 Chukchi	281 Penobscot	301 Luiseno	314 Assiniboine
20 Hadza	155 Koryak	282 Ojibwa	302 Kiliwa	314 Plains Cree
		282 Timiskaming	304 N. Paiute	314 Wahpeton
		282 Timagami Ojibwa	305 Chemehuevi	315 Crow
CIRCUM-MEDITERRANEAN	INSULAR PACIFIC	284 Tahltan	305 Kaibab Paiute	316 Arapaho
123 Saami	229 NW Australia (various)	288 Tlingit	305 Shivwits & Moapa	316 Cheyenne
	231 SE Australia (various)	291 Quileute	306 Walapai	316 Comanche
SOUTH AMERICA		292 Snohomish	306 N. Yavapai	316 Kiowa
367 Warao		293 Kathlamet	306 W. Yavapai	319 Winnebago
391 Selknam	NORTH AMERICA	293 Wasco	307 S. Ute	320 Menomini
391 Tehuelche	278 Noatak, Alaska	294 Coos	307 Uinta Ute	327 Jicarilla
392 Caduveo	278 W. Arctic, Canada	294 Coquille	308 Klamath	320 Menomini
392 Nivaclé	279 Netsilik	295 Karok	308 Modoc	327 Jicarilla
392 Toba	279 Iglulik	295 Shasta	309 Nez Perce	
394 Chorote	279 Polar Inuit	295 Wiyot	310 Coeur d'Alene	
394 Wichí	279 Greenland Inuit	295 Yurok	311 Chilcotin	
396 Ayoreo	279 Baffinland Inuit	298 Yuki	311 Lillooet	
396 Chamacoco	280 Eastern Cree	299 Monachi	311 Thompson	
401 Bororo	280 Naskapi	299 Yokuts	312 Kutenai	
		301 Cahuilla	313 Blackfoot	

Study Sample: Geographic Distribution

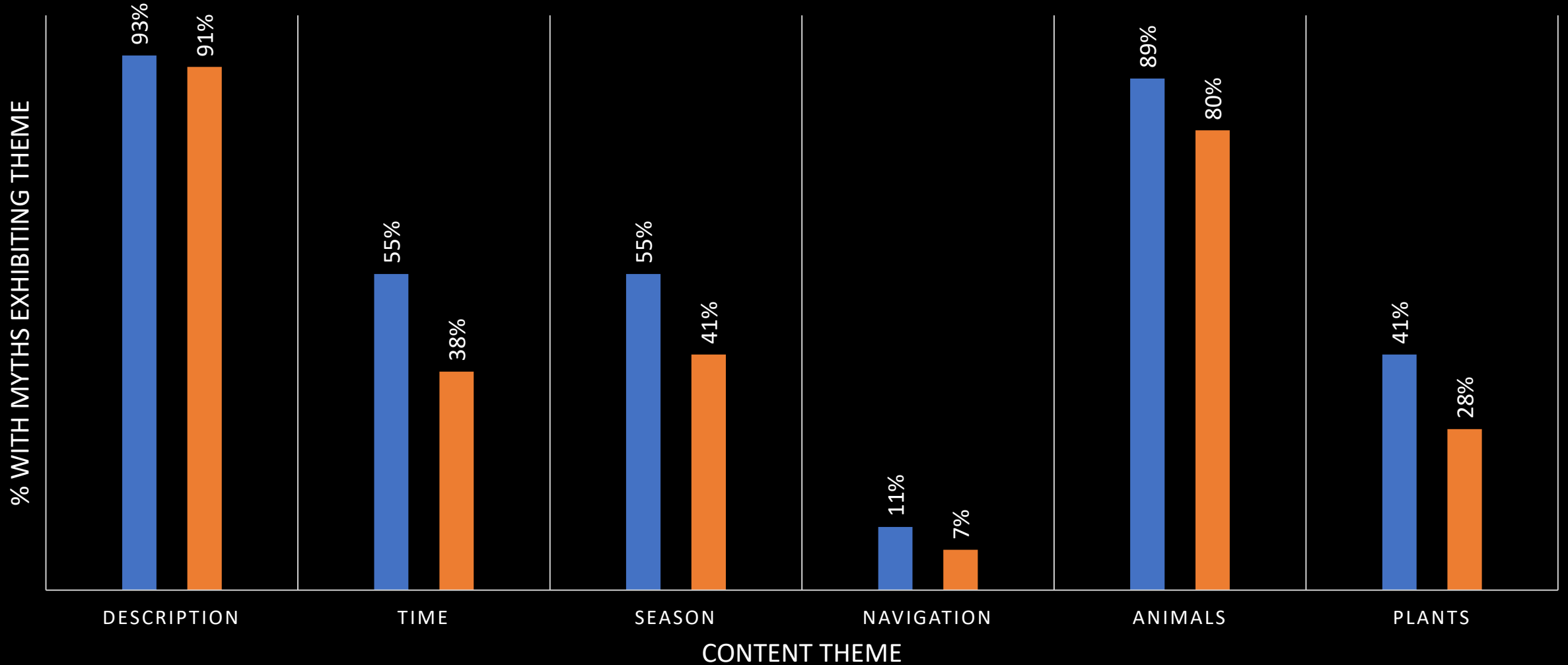


Results

FREQUENCY OF ECOLOGICAL CONTENT THEMES IN STAR MYTHS

■ Across 44 Forager Culture Regions

■ Across 82 Forager Cultures



Results

- Results indicate that star myths
 - consistently provide info that facilitates identification of asterisms
 - regularly associate asterisms with animal resources & (to a lesser degree) seasonal change, time telling, & plant resources
 - do not tend to reference navigation
- Use of asterisms for ecological purposes is not always explicit in stories
 - Ethnographic record checked for each region to ascertain whether asterisms were indeed used for these purposes



Pleiades or Seven Sisters

EXAMPLE (from Australia)

Myth

*“The **Seven Sisters** [Pleiades] rise in the east. **They urinate and make it very cold**” (Von Brandenstein 1970:50)*

Ethnographic Record

*“**The Pleiades**, when they were in the sky before dawn in the Great Sandy Desert of Western Australia, **were seen as a signal of the onset of the coldest nights**” (Johnson 1998:25)*

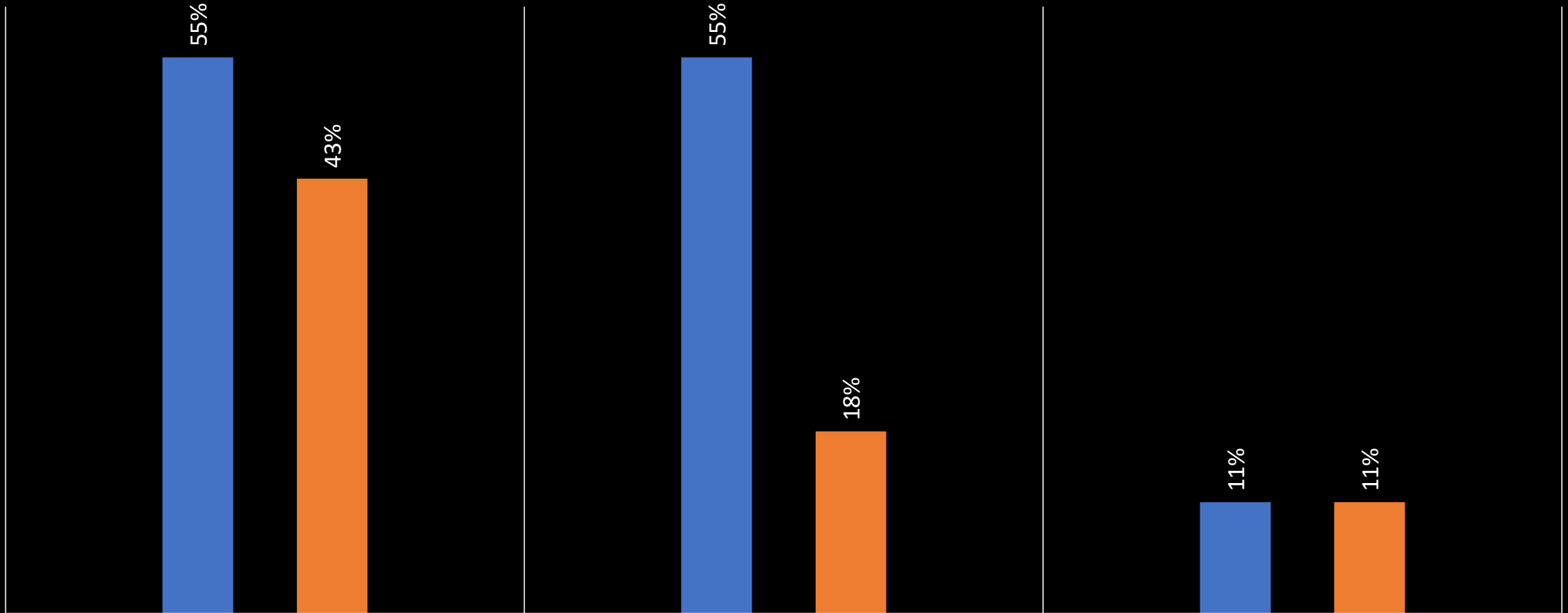
Forager culture regions in study sample for which ethnographic evidence of ecological asterism use was found.

CULTURE REGION	TIME	MONTH/SEASON	NAVIGATION
2 San		Khoisan (Medupe 2015:1033-4); /Xam (Snedegar 1995:537); Jū/wāsi (Marshall 1975:154, 157)	
123 Lapps	Saami (Kuoljok et al. 1993:15)	Saami (Kuoljok et al. 1993:15)	Saami (Kuoljok et al. 1993:15)
155 Siberians			Chukchi (Anisimov 1963:212)
229 NW Australia		Groote Eylandt (Mountford 1956:485-487; Johnson 1998:25); Arnhem Land (Johnson 1998:24-25; Mountford 1956:504); Yolngu (Clarke 2015:2228); Millingimbi (Johnson 1998:24)	Wardaman (Norris & Harney 2014:10)
231 SE Australia		Kulin, Wotjobaluk (Massola 1968:109-111); Mallee (Johnson 1998:24); New South Wales (Johnson 1998:25); Gullibul (Johnson 1998:116)	
278 Interior Inuit	General (MacDonald 2015:534, 537)	General (MacDonald 2015:534, 537)	Caribou (Birket-Smith 1929:154)
279 C & E Inuit	General (MacDonald 2015:534, 537)	General (MacDonald 2015:534, 537-538)	Iglulik (MacDonald 1998:538)
281 Maritime Algonkians		Micmac (Hagar 1900:96)	
282 Ojibwa	Chippewa (Densmore 1929:137)	Chippewa (Densmore 1929:137)	
294 Oregon Seaboard	Chetco, Galice Creek, Sixes River (Barnett 1937:176)	Chetco, Galice Creek (Barnett 1937:176)	
295 NW California		Shasta (Voegelin 1942:143)	
301 SW California		Cahuilla, Cupeño, Luiseño, Serrano (Drucker 1937:26); Luiseño (DuBois 1908:165); Cahuilla (Hooper 1920:362); Chumash, Gabrielino (Harrington 1942:29)	
302 Diegueño		Diegueño (Drucker 1937:26; Spier 1923:357-358)	
305 Southern Paiute		Chemehuevi (Laird 1976:93-95)	
306 Plateau Yumans		Walapai (Kroeber 1935:112)	
308 Lutuami		Klamath (Voegelin 1942:143,234)	
312 Kutenai	Kutenai (Turney-High 1941:98)		
313 NW Plains	Blackfoot (Hagar 1900:97)		
367 Orinoco Delta		Warao (Wilbert 1996:80-81)	
392 Guaycuru		Toba (Gomez 2015:282-283)	
394 Mataco		Wichí (Mariani 2017:289-290)	
401 Bororo	Bororo (Fabian 1982:290)	Bororo (Fabian 1982:290)	

ECOLOGICAL STAR USE: COMPARISON OF STORY & ETHNOGRAPHIC RECORDS

■ Story Record ■ Ethnographic Record

% OF REGIONS REFERENCING ECOLOGICAL STAR USE



SEASON

TIME

NAVIGATION

ECOLOGICAL USE

Conclusions & Future Research

CONCLUSIONS

- Like early farmers, foragers use stars for subsistence purposes & encode star knowledge in myth
 - This practice may have emerged early in our species' evolution
- Findings support claims by indigenous informants that storytelling is an important means of transmitting traditional ecological knowledge
 - Storytelling may have been one of the earliest forms of teaching in human evolution

FUTURE RESEARCH

- Continue search of ethnographic record
 - How were stars used?
 - Analyze by culture
- Role of animals & plants referenced in stories
 - Important for food, clothing, trade?
 - Cues to availability of important resources?
- On average, how many different types of ecological information are encoded in a given story?

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