

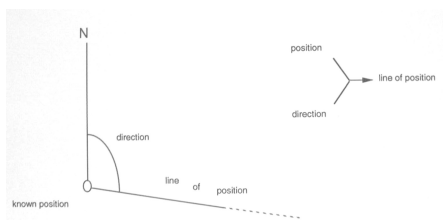
A Computational Perspective on Navigation

Part 2: Micronesian Navigation

Constraints

- A constraint excludes some possibilities in a range of possibilities.
- A particular constraint may leave many possibilities in play.
- Constraints can be combined to restrict the range of possibilities in play.
- Sometimes it is possible to combine constraints in a way that leaves only a single possibility.

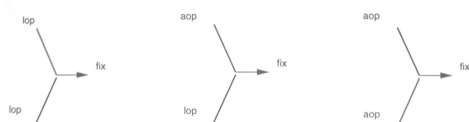
Line of Position



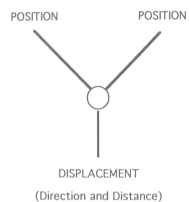
Arc of Position



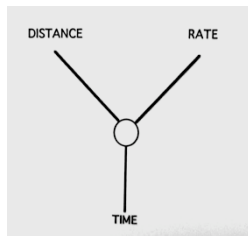
Combining one-dimensional Constraints



Position/Displacement Constraint



Distance, Rate, and Time Constraint



Micronesian Navigation

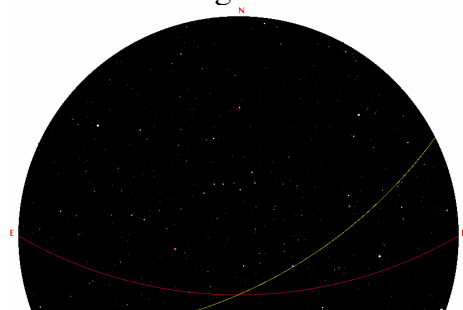
South Pacific



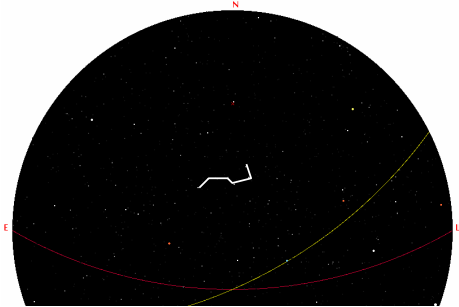
Voyaging requirements

- Set out in the right direction
- Maintain course while traveling
- Determine when to look for the destination

Seeing stars...



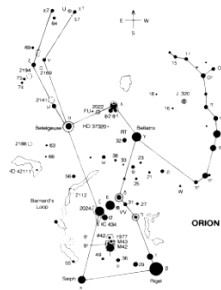
Seeing stars as constellations



The constellation Orion



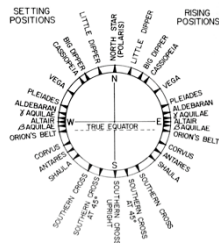
Star Chart of Orion



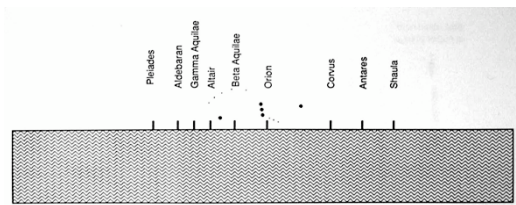
Orion and Mythology



Caroline Island Star Compass



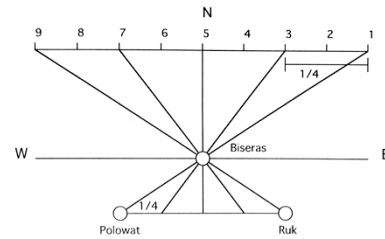
Looking East to where the linear constellations rise out of the horizon



Linear Constellations

- Provide directional reference for course setting
- Allow navigator to maintain course
- Via the concept of ETAK are essential to determining when to look for the destination

Western Conceptualization of Micronesian concept of Etak



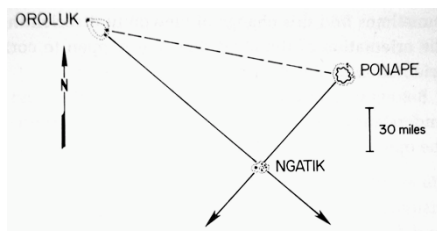
Anomalies

- Square compass - horizon as straight line
- Phantom Etak islands
- What is input and what is output?
 - Dead reckon position to find etak (Sarfert)
 - Imagine Etak to establish position (Gladwin)
- Near and far Etak islands
- Etak island on both sides of the course
- Etak of sighting and Etak of birds

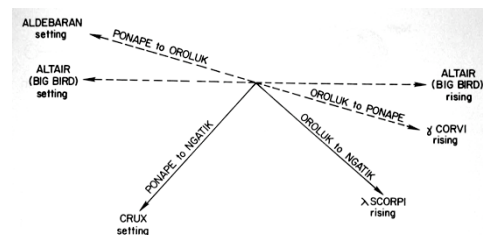
Too quick a conclusion?

- Although ETAK has for us much the quality of a systematic organizing principle or even logical construct, the Puluwat navigator does not let logical consistency or inconsistency, insofar as he is aware of them, interfere with practical utility. (Gladwin, 1970:189)

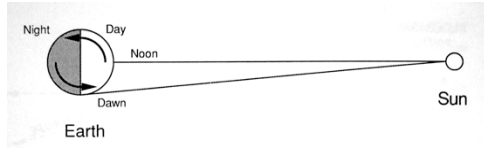
How Lewis located Ngatik



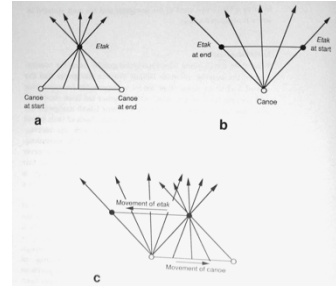
Hipour's star bearings to Ngatik



Point at the Sun Twice



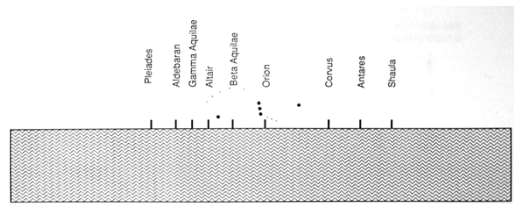
What moves?



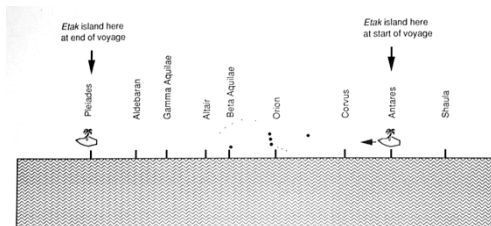
What the navigator sees



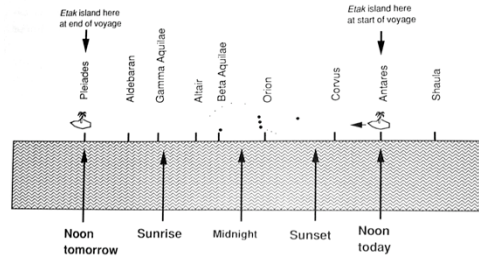
Horizon with Star Points



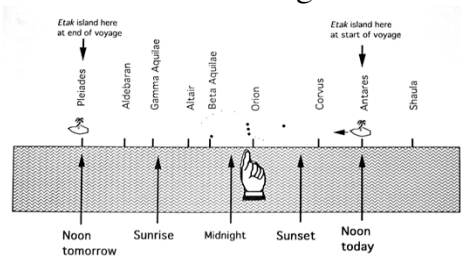
Etak bearings on the Horizon



Horizon with temporal landmarks



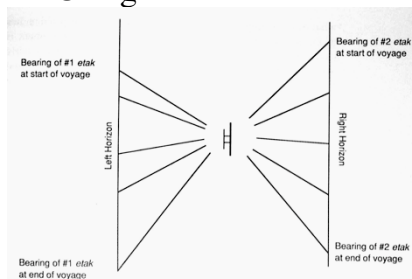
Pointing to the Etak island just before midnight



Anomalies

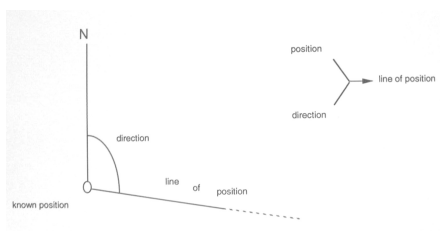
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Using two Etak islands



How Micronesian Navigation satisfies the constraints of navigation

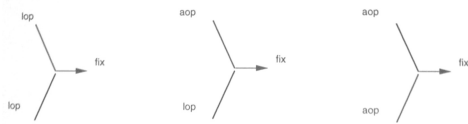
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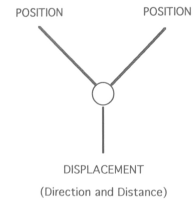
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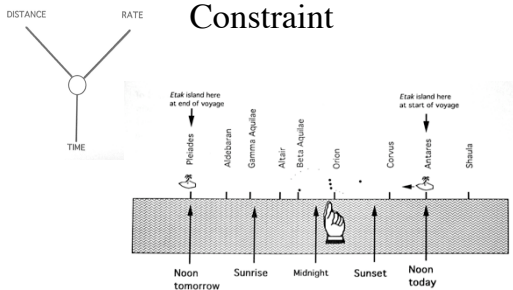
Combining one-dimensional Constraints



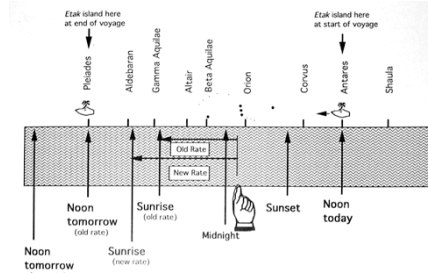
Position/Displacement Constraint



Distance Rate and Time Constraint



Adjusting for a change in speed



Western and Micronesian Navigation

- Computational level constraints set by geometry and our definition of navigation
- Radically different descriptions at the representational and algorithmic level
- Radically different implementations
- The practices of navigators in the two traditions (how they use their brains and bodies) to DO navigation are very different.