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

Dependencies in the Cognitive Ecology of Navigation

- Parallel ruler and chart projections
- Astrolabe and star finder
- Sextant, tables, chronometer
- GPS and moving maps

Micronesia 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

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

Using two Etak islands

How Micronesian Navigation satisfies the constraints of navigation

Line of Position
Arc of Position

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.