Chapter 4.
Application to Anthropology: Jamaican Fishing

- Nature of the Problem
- Solution Using Game Theory
- Solution Using Decision Theory
- Rationale Using Security Principal

Functional Adaptation

- Jamaican villages of the 1950s made their living by fishing
- How do these inhabitants adapt in a functional way to their environment?
- First studied by anthropology in 1960 by Davenport

Image from wikimedia commons, originally posted to Flickr by Stig Nygaard, licensed under cc-by-2.0.

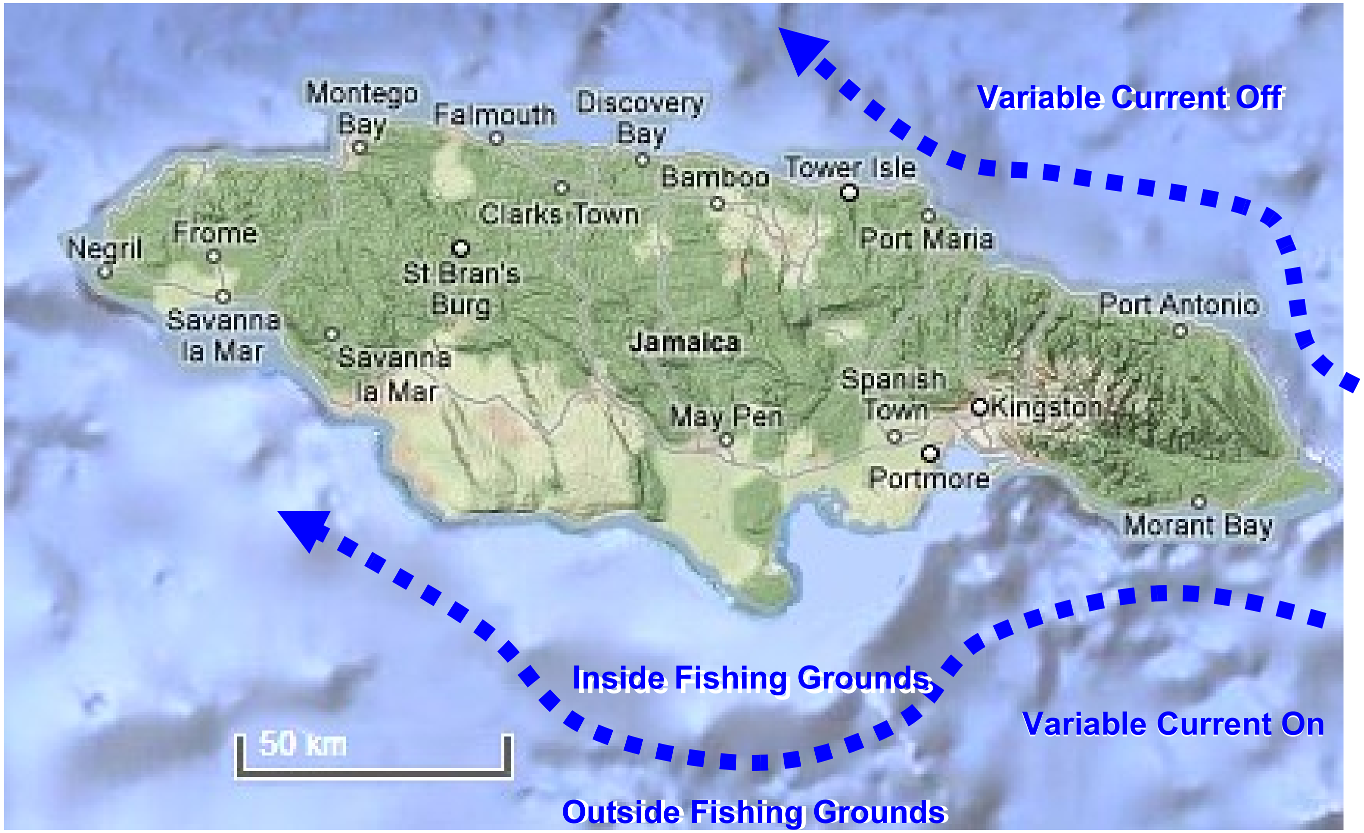
Jamaica Nautical Chart

Adapted from Google Earth, © 2009

Functionalism

- The functionalist school of anthropology argues that rules or customs evolve because they are functional responses to the natural or socio-economic environment
- Functionalist explanations are used in evolutionary economics, and studies of social or technical change

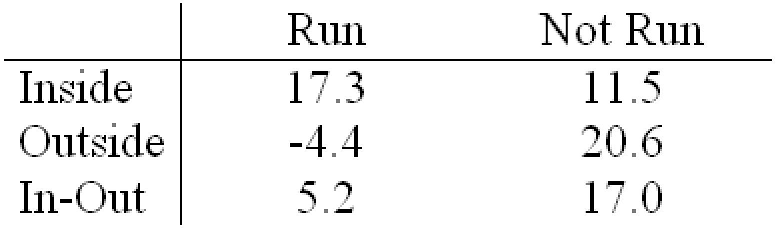
Jamaican Currents



Adapted from Google Earth, © 2009

Data Gathering

- Davenport gathered data about average profits of fishermen
- Do they fish far out to sea, or stay close to shore?
- He later realized the problem was amenable to game theory analysis



	Run	Not Run
Inside	17.3	11.5
Outside	-4.4	20.6
In-Out	5.2	17.0

Table from Game Theory and Strategy (Straffin 1993) p.24

Saddle Point Analysis

- No Saddle Point!

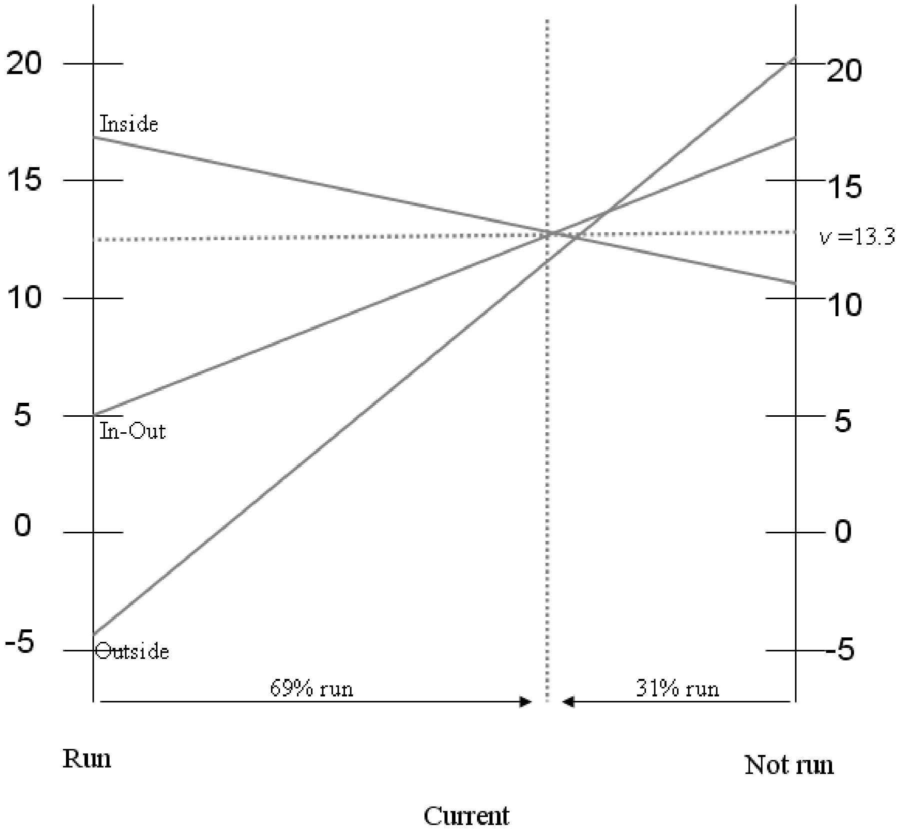
	Run	Not Run	Row min
Inside	17.3	11.5	11.5
Outside	-4.4	20.6	-4.4
In-Out	5.2	17.0	5.2
Column max	17.3	20.6	

Max of min

Min of max

- Since the row and column values are inequal, there are no saddle points

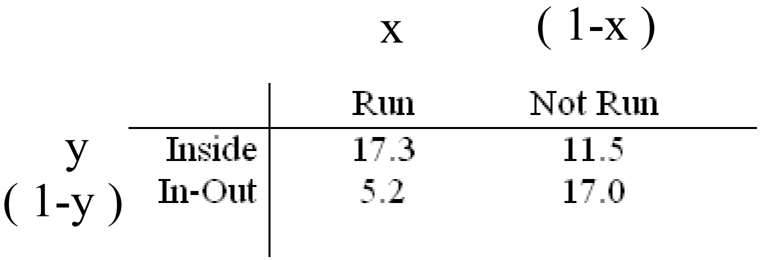
Mixed Strategy Graphical Solution



- Lowest point on upper surface v=13.3
- Inside and In-Out strategies active
- Use equilized expectations to further solve

Diagram from Game Theory and Strategy (Straffin 1993) p.25

Mixed Strategy Equalized Expectations



		x	(1-x)
		Run	Not Run
y	Inside	17.3	11.5
(1-y)	In-Out	5.2	17.0

17.3x+11.5-11.5x = 5.2x+17-17x

34.3x-16.7x=5.5

17.6x=5.5

X=31%

v=(31%)5.2+15(69%)=13.31

17.3y+5.2-5.2y=11.5y+17-17y

17.3y+17y-11.5y-5.2y =11.8

17.6y=11.8

Y=67%

v=(67%)17.3+(33%)5.2=13.31

Prediction and Observation

So a game theory model predicts

- No fisherman takes the risky strategy of fishing outside
- The fisherman adopt a fishing strategy of 67% inside, and 33% in-out.
- That the current should run 31%, and not run 69%

Observation shows that

- No fisherman takes the risky strategy of fishing outside
- The fishermen adopt a fishing strategy of 69% inside, and 31% in-out.
- The current runs 25% of the time, and does not run 75% of the time

TUDelft

The Counter-Claim

- The current is not a reasoning actor.
- The problem is really one of decision-theory.
- Thus, an expected utility calculation is needed.
- Using observed probabilities of the current
    - Inside: (25%) 17.3 + (75%) 11.5 = 12.95
    - Outside: (25%) -4.4 + (75%) 20.6 = 14.35
    - In-Out: (25%) 5.2 + (75%) 17.0 = 14.05
- A paradox:

  Decision theory predicts that utility maximizing fishermen should fish outside the current. Yet, they do everything but!

A Response

- The current is not reasoning, but the fishermen are being very, very cautious.
- By treating the current like an opponent, the fisherman can guarantee at least the value of the game (the “security level” of 13.30)
- Should the current run at different frequencies than assumed, the fisherman will do even better than expected
- In other words, the fisherman are paying £1.05 (14.35-13.30) as a sort of insurance policy to ensure security of supply