Future Directions in Information Access
• 7th Future Directions in Information Access

• A forum for students to present their research topics

• Fun, Friendly, Informal but Informative

FDIA 7
• **PC Chairs**: Leif and Max

• **General Chairs**: Ioannis, Theodora, Symeon, Stefanos

• Thanks to all the reviewers

• And of course thanks to all our students

**FDIA 7**
The Search for Knowledge
Leif Azzopardi
University of Glasgow
ASK

• Anomalous  • Always

• State of  • Seek

• Knowledge  • Knowledge
Question More
KNOWLEDGE IS POWER

Francis Bacon
Read More
THE ONLY SOURCE OF KNOWLEDGE IS EXPERIENCE

Albert Einstein
Do More
THE SCIENTIST IS NOT A PERSON WHO GIVES THE RIGHT ANSWERS BUT ONE WHO ASKS THE RIGHT QUESTIONS

Claude Levi-Strauss
Argue More
One of the greatest joys known to man is to take the fight into ignorance in search of knowledge.

Robert Staughton Lynd
Think More
MY FUN INTERRUPT YOUR FISHING

Sabretooth, X-men
Fish More
A Theoretical Interlude

INFORMATION FORAGING THEORY
Foraging theory aims to understand the rules that shape the foraging behavior of animals.

- A key assumption is that animal aim to maximize the energy gain per unit of time, as this resource is likely to increase their chances of survival and reproduction.

Foraging Theory has been proposed by a number of researchers including:

The Oyster Catcher
Bates’ Berry Picking Models

Bates (1989)
• People will **modify** their **strategies** in order to **maximize** their **rate** of gaining **valuable information**.

• **Information systems** will **evolve** so as to maximize the **gain** of **valuable information per unit cost**.

• One strategy/system is **superior** to another if it yields more **valuable information per unit cost**.

**Information Foraging Theory**

- Resnikoff (1989)
- Pirolli & Card (1999)
Information Patch Model

Pirolli & Card (1999)
• Describe how foragers move between and within information patches.
  – When information is distributed in a number of patches the forager needs to decide which patch to go to, and how long to stay in a patch

• Predicts the amount of time a forager would/should spend within a patch
  – Assumes that the forager will go the patch that they expect to yield the highest profitability, first then next.

Information Patch Model

Pirolli & Card (1999)
As a forager spends more time in the patch they receive more gain.

Patch Example
• The theorem was developed to deal with the analysis of time allocation for patch that yield diminishing returns.

• The theorem predicts that a forager should remain in a patch so long as the slope of the gain function is greater than the average rate of gain in the environment.
  • i.e. a forager wants to maximise the gain per unit of time

Charnov’s Marginal Value Theorem

Charnov (1976)
When to stop searching
Change in Gain over Time
• If the \textit{between-patch} (query) time increases
  • Foragers will spend more time within the patch.

• If the \textit{average gain} in a \textit{patch} (result list) increases,
  • Foragers will spend less time within patches

• If the \textit{average gain} in the \textit{patch} is constant
  • Foragers will stay in the patch, until they have ran out of time, reached their saturation point, or exhausted the patch.
Other Theoretical Models

- Information Foraging Theory
  - Pirolli & Card (1999)

- Interactive Probability Ranking Principle
  - Fuhr (2008)

- Search Economic Theory
  - Azzopardi (2011)

- Card Playing Model
  - Zhang & Zhai (2015)

Theorise More
Model More
GO FISH

Do ESSIR 2015 participants search optimally?
As move cost increases, foragers should spend longer in each patch. The players in the game were rather invariant to move cost!!
Depth in the patch has no bearing on how long one should stay. However, players tended to stay longer on deeper patches.
Most players don’t spend long enough in the patch. Early stoppers!

= 0, the searcher spent the optimal amount of time in the patch.

> 0 too long

< 0 not enough

Most players stopped at -2, i.e. 2 less than the optimal.
As level increases (more experience playing), the better players get.
Dig More
Depth vs. Breadth

A PhD is about depth. It is tempting and more exciting to go for breath!
Twitter: @leifos
Web: www.leifos.org
Scholar: bit.ly/google-scholar-leifos

Shameless Self Promotion
Including your twitter handle, etc, lets people get in touch with you.
Wants some more fun searching, this game has many more cues & tools!
• Bates, (1989), The design of browsing and berrypicking techniques for the online search interface. Online Information Review
• Belkin & Oddy (1982), ASK for Information Retrieval, Journal of Documentation

References
• Fuhr (2008), Interactive Probability Ranking Principle, JIR
• Pirolli & Card (1999), Information Foraging Theory, Psychological Review