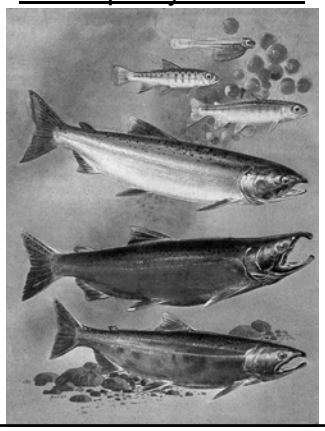
Present versus Future Reproduction

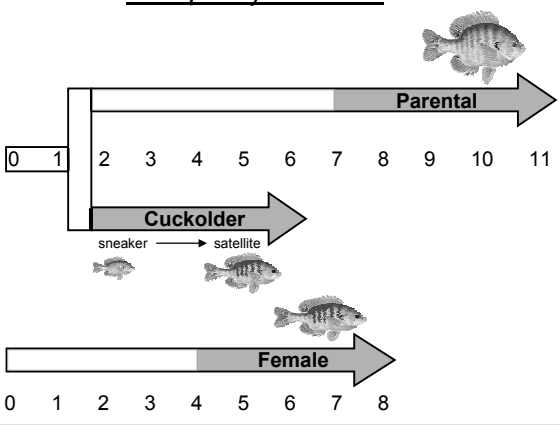
Semelparity: The occurrence of a single act of reproduction during an organism's lifetime. Semelparous species usually produce large numbers of offspring and then die shortly afterwards.

Iteroparity: The repeated production of offspring at multiple intervals during an organism's lifetime.

Semelparity: Salmon

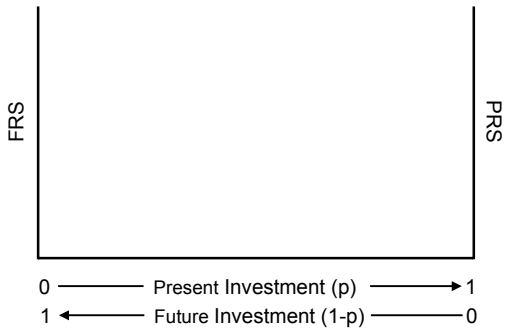


Iteroparity: Sunfish



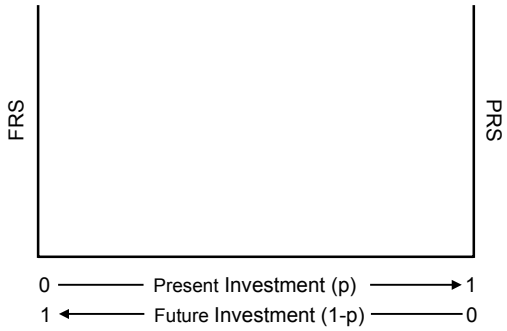
Present versus Future Reproduction

- semelparity - salmon



Present versus Future Reproduction

- iteroparity: sunfish



Present versus Future Reproduction

Maximize: $LRS(p) = PRS(p) + FRS(1-p)$

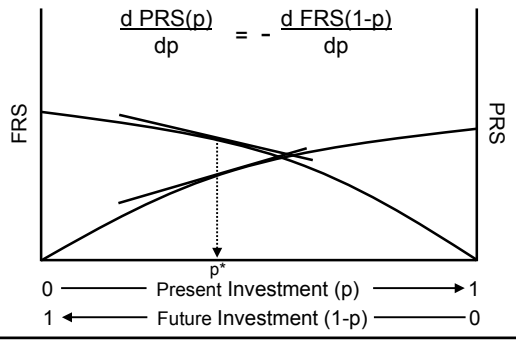
Derivative:

Equivalence:

Optimal:

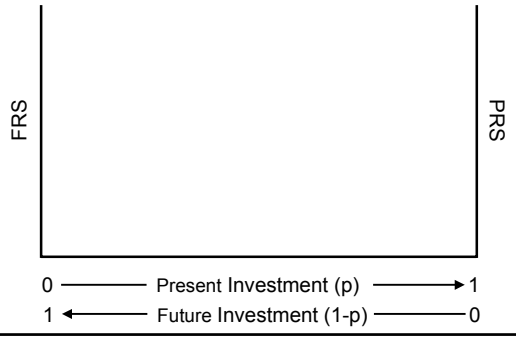
Present versus Future Reproduction

At optimal investment, slope of tangents are equal but opposite in magnitude



Present versus Future Reproduction

What would be the effect on the optimal investment if a parent's brood was reduced in size by half?



Present versus Future Reproduction

1. Male guppies actively court females in an attempt to copulate with them. After a successful copulation, males move on to another female. Copulations can be risky as they increase the male's susceptibility to predation.

- Suppose you are a male guppy and you are actively courting (and copulating) with females in your home stream in Trinidad. Now suppose that you discover a predatory cichlid has moved into your area on its way downstream. Should you increase or decrease your courtship rate, and why?

Present versus Future Reproduction

2. Parental male bluegill sunfish provide sole parental care for the young in their nest. This care is essential for the young's survivorship.

- Suppose you are a nesting parental male bluegill and you have just been heavily cuckolded by sneaker males. What effect will this have on your optimal investment if:
  (a) you expect that the high cuckoldry rate was simply 'bad luck', and you hope to do better next breeding bout;
  (b) you realize that you are no top dog, and can't expect any less cuckoldry in the future; and
  (c) time has caught up to you and you realize that this is your last breeding attempt.

Concorde Fallacy

Past investment influences present investment decisions

1. Only supersonic passenger jet
2. Designed in 1960s
3. First production plane in 1973
4. Only 18 ever built
5. Realized during early production that plane was not going to every make any money
6. Decided to continue productive because of large past investment

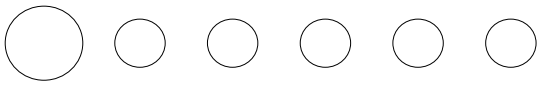
Concorde Fallacy

Bluegill sunfish appear to commit the Concorde fallacy

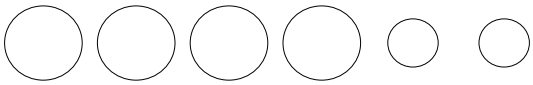
Concorde Fallacy

- Brood reduced by half either 2 or 5 days after spawning
- Parental investment quantified on day 6

Small Past Investment



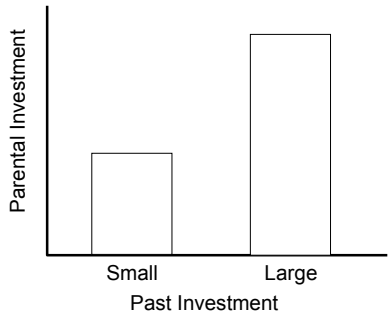
Large Past Investment



Day: 1 2 3 4 5 6

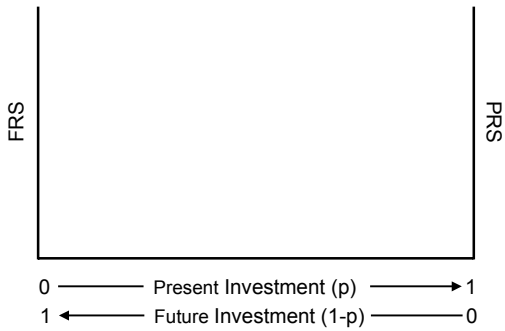
Concorde Fallacy

Bluegill sunfish appear to commit the Concorde fallacy



Present versus Future Reproduction

How might past investment influence present investment decisions?



Summary

1. Lifetime reproductive success (LRS) is equal to present reproduction plus future reproduction.
2. An individual's optimal investment maximizes LRS, and occurs when the marginal rate of return from present investment is equal (but opposite in sign) to the marginal rate of return from future investment.
3. Semelparity is the occurrence of a single act of reproduction during an organism's lifetime, while iteroparity is the repeated production of offspring.
4. Semelparous organisms have low expected future returns relative to present returns, while iteroparous organisms have both present and future returns.

Summary

5. The Concorde Fallacy suggests that past investment can not influence current decisions, which are dependent only on returns from present and future investment opportunities.
6. However many organisms, including bluegill sunfish, appear to commit the Concorde Fallacy.
7. Resolutions comes from past investment reducing the expected future returns, thus shifting optimal investment towards increased investment in the present.