Reflection 3: Kin selection and group selection

Reading: Birch and Okasha- Kin Selection and its Critics

Due via Dropbox on Tuesday, January 31, by 1:00 pm.

In class last week, I suggested that Dawkins' rowboat analogy is in fact a description of group-level selection; not, as he pitches it, a case of selection at the level of the individual gene. The thinking here went something like this:

1) If selection were acting at the level of the gene in this case, it would be impossible for individually selfish rowers (alleles) to outcompete altruistic rowers.
2) Competition at the boat level can, however, potentially favour altruistic over selfish rowers. This can happen, I argued, if boats containing "altruistic" rowers were (i) more coordinated than boats containing selfish rowers, and (ii) coordination is positively correlated with boat speed. (I attempted ad too the plausibility of this by appealing to the good old chicken example)

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C) Since selfish rowers do not always out-compete altruistic rowers, selection is acting in this example at levels of the boat, not the gene.

Some students raised objections to my argument. In retrospect, I think that they were correct to do so. If we restrict ourselves to just the boat analogy as it stands, the only way for a rower to cross the finish line is by climbing into a boat with other rowers. (Several of you emphasized this point). This implies that a "selfish' gene (rower) is actually one that coordinates with teammates. I was assuming that selfishness could be measured independently, for example, by having rowers race solo (more on that in a second).

To put the point differently, a feature of this example is that "group fitness" (so to speak) is equal to individual fitness. This is true, at least, on a race-by-race basis. At that level, the fitness of an entire team is reducible to the aggregate fitness of its members without any loss of information.

It can still be argued that this description abstracts away the relevant causal details. That competition and selection are really happening at the boat level. So call it what it is: boat selection, not rower selection. I have some sympathy with this. But I can also see how it might be useful to make predictions at the level of the individual rower.

But let's now consider a second aspect of Dawkins' example. Notice that as he described it, selection over successive generations is happening at the level of the individual rower. The coach puts together each new team on a rower by rower basis. This removes all heritability at the group level over the long run. There is no way of tracing a lineage of fast teams (or partial tams). All we have are individual rowers. So, yah, no wonder this seems like a case of gene-level selection. We have variation and selection, but no heritability at the boat or team level. You need all three for selection to happen.

So let's play around with this example a little bit. What follows are a couple of questions about multi-level selection, framed in terms of the rowing analogy.

Questions

1) Imagine a scenario in which each team race is followed by a solo race. For example, race 1 is between two boats. One containing Mary, Roderick and Gwendaline, the other containing Lawrence, Gertrude and Polly. This race is followed by a race among all six contestants, each in solo boats. And so on – you are free to imagine how it might go. You do not need to name the individual rowers as I have done (this was only to help you imagine the scenario). The question I want you to consider is whether there is ANY possible scenario in which we are required to view this as a case of multi-level selection? That is, are we ever required to assign fitness values at both the level of the boat (or team) and the level of the rower, in order to explain the outcome. Alternatively, is any outcome possible to explain at the level of the gene, that is, by assigning fitness values to individual rowers?

2) Turning to the reading for this week, it is a bit hard to translate the boat analogy into a case of kind selection. The reason being that individual rowers tend not to be related. But let's add another layer to the example. Suppose that some rowers are clones. It is possible for a rower to have multiple clones. So, for example, you might be rowing against a multi-person boat that contains two of your clones. In its basic formulation, inclusive fitness theory predicts that you should forego the race in this scenario. The other boat is more closely related to you on average than your own boat is.

   One question that I want you to think about is how the two different descriptions of kin selection theory would explain this scenario. Specifically, how would it be explained under neighbour modulated fitness compared to inclusive fitness? The point here is to get you thinking about the difference.

3) Pease come up with a question of your own about the reading this week.