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PAUL BALLONOFF

The thought-provoking review of Denham by Dr. Robert Banks points out some very important parts of cultural analysis, unfortunately seldom discussed. Some of the questions posed by Banks are in part answered by two citations in Denham's original paper: those of Hirshleifer (1977) and Gammage (2011). While Denham discusses Gammage in a bit more depth (pages 82 and 83), he cites Hirshleifer for more narrow reasons. Hirshleifer, a micro-economist, was one of the original modern thinkers on how biological and cultural evolution can be treated as one subject. Had Hrdy not treated the subject, Denham could have proposed his study showing that Hirshleifer predicted much of what Denham found.

Hirshleifer (1977, page 4) initially cites to Alchian (1950) and discusses that economic predictions are based on finding "viability", not "profit maximization":

... Alchian argued that environmental selection ("adoption") could replace the traditional analysis premised upon rational profit-maximizing behavior ("adaptation") as a source of verifiable predictions about visible characteristics of business firms.

Hirshleifer then discusses how analysis of viability, in connection with biological and cultural evolution, can lead to altruistic behavior (1977, page 26), *emphasis* added:

Summing up, we have seen how altruistic behavior may prove to be *viable* in selectional terms even in the absence of any reciprocation. Over the course of human and pre-human evolutionary development, drives or instincts promoting such behavior have evolved and ultimately taken the form that the economist so inadequately calls preferences. ... [they are] ... the resultants of systematic evolutionary processes. ... [they can be] ... modified by cultural evolution. The main lesson ... [is that] ... they are scientifically analyzable and even in principle predictable in terms of the inheritance of past genetic and cultural adaptations together with the new adjustments called for by current environmental circumstances.

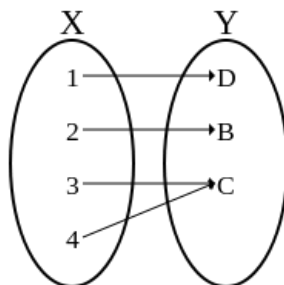
And thus the relationships discussed by Hirshleifer (1977, page 34) are:

The degree of conflict or of social cooperation is not a simple function of closeness of relationship, but depends upon the specific details of kinship as related to the environmental situation.

In conclusion Hirshleifer states (1977, page 52):

It was not very debatable, perhaps, that the sociobiological approach does have some utility for social science purposes. ... Among such might be included: (1) the transcending importance of cultural as opposed to genetic change; (2) the degree of intelligence and awareness, suggesting that man can henceforth regulate and control the evolutionary process ... and (4) what might hopefully be a countervailing factor, man's possession of moral, spiritual, and ethical values.

Many anthropologists might consider Hirshleifer items (1) and (2) to be at least things they have considered. But what about (4), and in particular “ethical values”? Banks specifically shows us how that can occur. First, a bit of background. Ballonoff (2008) demonstrated that a descent relationship as studied by anthropology is a surjection. (Ballonoff also uses the same survival relationship as does Hirshleifer: it studies viable descent, as a means to find verifiable predictions.) Using an illustration of a surjection taken from Wikipedia, assume the objects in set Y (which we here assume are all of the parents that have offspring – the reproducing parents), while the objects in X are all of the people in the population we are studying.



We assume, as does any descent relationship assume, that all people in the population X are offspring of someone. Then every object in X is assigned to some reproducing object in Y. More than one object from X could be assigned to a particular “family” in Y, but every object in Y gets at least one object in X assigned to it. Because descent is a surjection, then Hilton (1994) showed that the distribution of objects associated by it are determined by the Stirling Number of the Second Kind (SNSK). The SNSK counts the number of ways to partition a set of labelled (unique) objects into a set of nonempty unlabeled subsets.

Now apply this to the descent relationship described by Denham for the Alyawarra: it is a helix (Denham, 2012). Because it is a helix, at time t of anthropological observation, the currently existing population at time t is a portion of the set X. Because the descent relation is a helix for Alyawarra, unlike cultural systems that can be described using discrete generations, the helical relationship covers all of the Alyawarra, past, present and future, as one descent relation (not a sequence of separate ones by distinct “generations”) that covers the entire history. All of the objects in X are descended from reproducing parents in Y. (We allow the initial members of the Alyawarra to perhaps have descended from some folks just “outside” of X). The existing population at time t are the then visible parts at t of one “generation” that covers the entire history of the Alyawarra.

Banks, page 6, observes the Alyawarra kinship system:

One can envisage a multi-dimensional matrix of interactions between/amongst all extant and ancestor individuals – genetic relationship, moiety, shared location, direct contact such as via being carried or being a carrier ... it is very appealing to imagine that this multi-dimensional matrix would have a much more even distribution of coefficients than would be expected by chance or by the workings of social power laws – and if it did, this would have to reflect some sort of shared consciousness or collective wisdom.

That is, Banks observes the fact that similar to the Alyawarra system as summarized in the preceding paragraph (but which also includes future Alyawarra), includes all past and present

people into one relation showing a “shared relationship or collective wisdom”. Banks then notices a consequence of the SNSK distribution on this relationship (*emphasis* added):

... it seems that it would be possible to allocate all individuals in Dr. Denham’s study group to their respective consanguineal, affinal and other “classifications”, and so I wonder whether the usual situation is that no two individuals in a “band” actually fall into the same n-dimensional classification cell, and hence, everyone is usually expected to be *unique* ...

If one takes their basic statistics book, one finds that objects distributed by the SNSK are also described in statistics books as allocating unique objects (objects like genetically unique individuals), into non-unique sets of objects (like numbers of pairs of “reproducing parents”). Thus Banks observation that the descent relationship of the Alywarra allocate *unique* individuals is literally true. In fact, any cultural system having a descent relationship has this property.

Banks thus also shows that because descent is a surjection (and therefore the inference that SNSK is required) has another empirical consequence: it implies Hirshleifer’s item (4): the moral implication that unique individuals (genetically individual humans) are assigned to specific relationships. And, because the Alywarra descent relationship is literally one relation on the entire cultural group, then thus also, per Banks (page 6):

“ ... presumably could be considered to be optimal in an extremely resource-limited environment, and one which had been so for a very long time.”

And this in turn leads to the second reference found in Denham, that to Gammage (2011). Hirshleifer item (2) discusses long term adaptation to the genetic and natural environment, “that man can henceforth regulate and control the evolutionary process”. Says Banks (page 6):

... it seems to me that Aboriginal Australians have been immersed in, and managing, and co-creating and nurturing, network society, for tens of thousands of years.

Denham cites this, in his reference to Gammage. The Australian environment (after arrival of the native Australians, and prior to being disrupted by later human invasions) experienced long term management. Humans, as described by Gammage, devised relations of many parts of the Australian natural environment, and did what Banks (page 6) implies:

... such a system inherently both very rich and very fragile, or at least susceptible to certain sorts of “invasion” – which is pretty much exactly what happened in Australia.

Banks seems surprised that this occurred under non-western “management”. Hirshleifer however implies it can occur because it is the natural result of biological and cultural evolution, based on maintaining viability.

Banks has many more questions. One much suspects that many of them can be addressed, in Australia, by extending the analysis started by Hirshleifer, using Banks directions of enquiry, based on data found by Gammage and Denham.

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