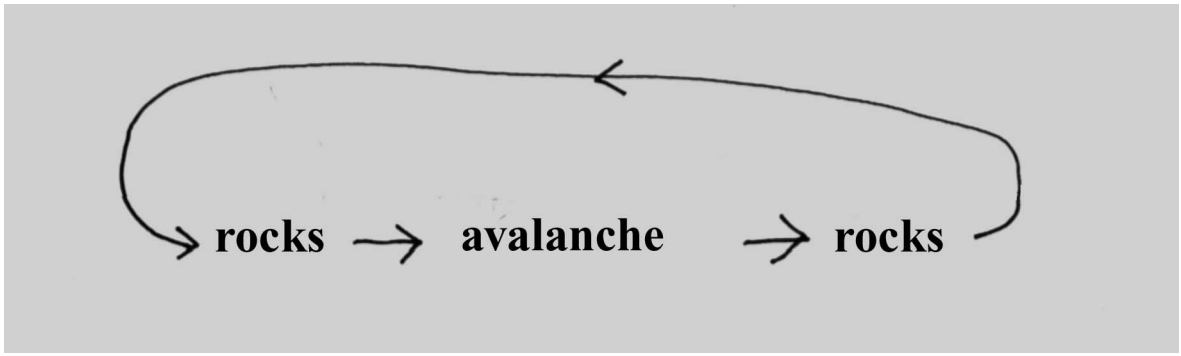
Moderated Positive Feedback
(in Emergence & Life?)

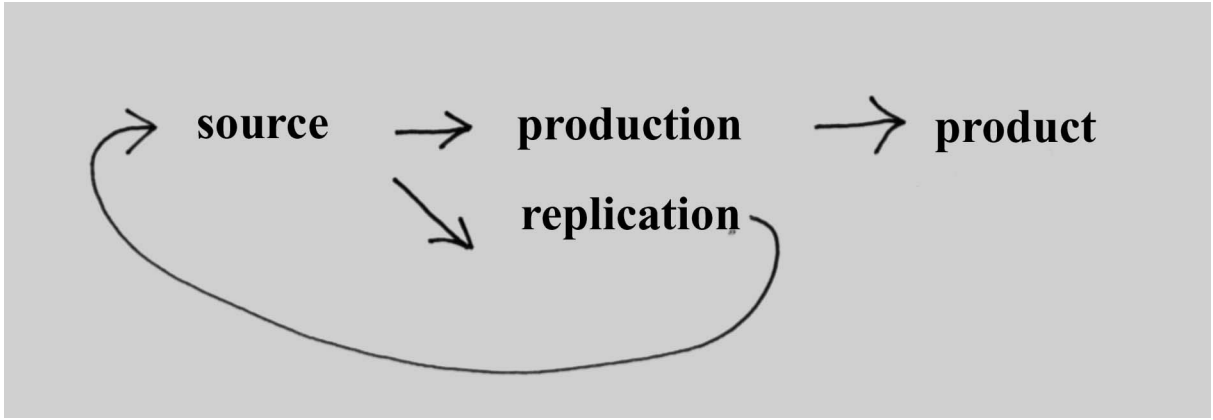
NOTE: This paper is only the most recent in a series of contributions concerning the role of positive feedback in Emergence. Now, though this paper does bring the topic to some sort of conclusion, it doesn't repeat everything from the previous papers. Hence for a comprehensive look at this area, it is suggested that the following papers are also studied.
Both are in Philosophical & Design Papers Volume III

1. Sequences of Feedback	feedbckseqs.doc	04/01/07
2. Modelling Positive Feedback	feedbackmosel.doc	15/01/07

Elsewhere I have rather blithely suggested a transition from a normal positive feedback – the avalanche! into a moderated positive feedback, and its position in a sequence or cycle of such processes. But, I believe that there are evident gaps in those arguments, because of the quite clear intrusion of another factor – the catalyst, in most of these processes when related to Living Things, and hence also in the Emergence of Life itself.
A basic avalanche requires and produces ROCKS, and hence is self maintaining until detachable rocks are no longer accessible to feed the monster, or by the lack of gravitational force when the slope finally reduces to the plain.

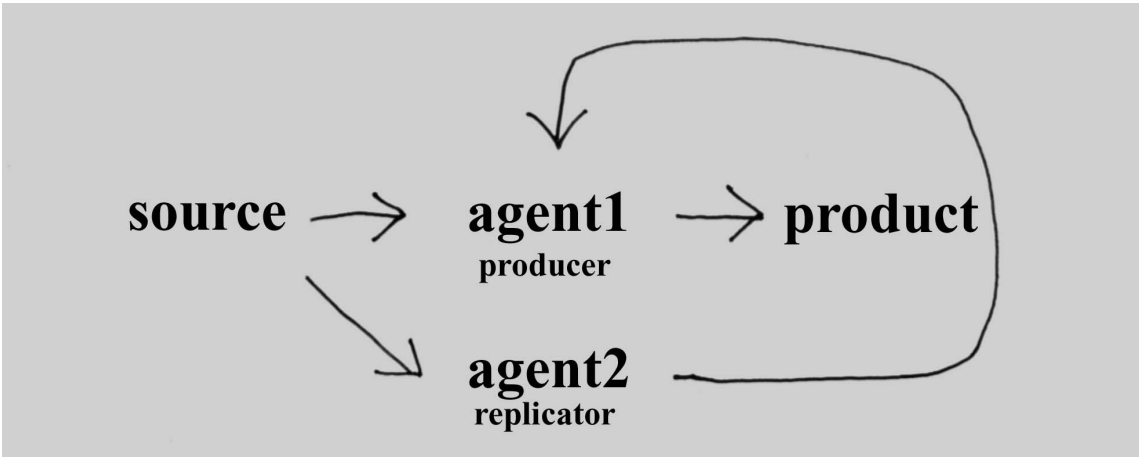


It must be admitted that the analogy with processes connected with Life is rather too far fetched and, of course, inappropriate as avalanches are episodic and don't produce anything useful. We have to modify our model. And the first step will be that source and product will NOT be the same. This modification does remove the important multiplicative effect immediately, so we then have to modify yet again in another way. Instead of the process Rocks–into-Rocks, with the latter causing yet other additional processes of the same kind, we have to now conceive of a model a **replication** function is also present alongside the production process. With the crude model, rocks were both product AND producer of more identical processes.

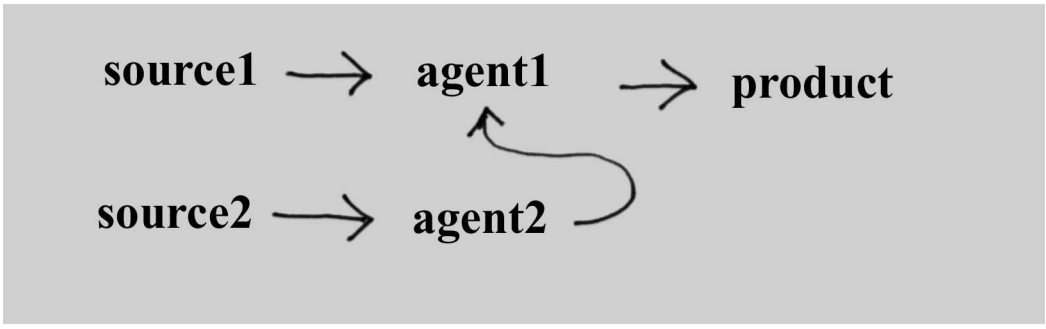


Our modified version is shown above. Two processes are necessary, so we differentiate between them and call the perpetrators agent1 & agent2.

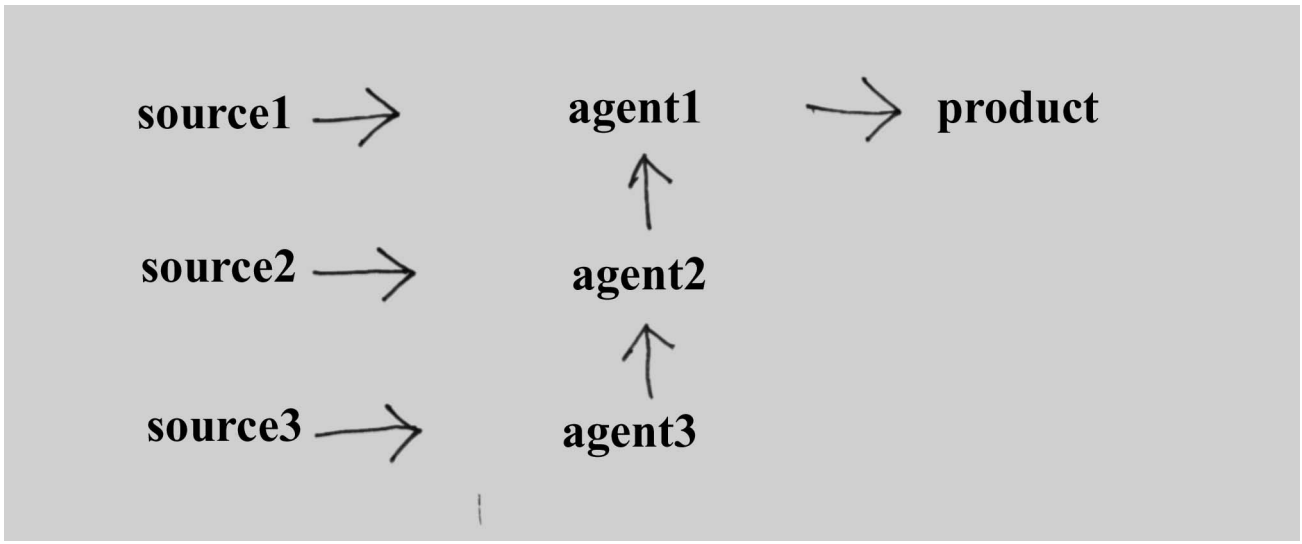
Agent1 is the producer and generates a product.
Agent2 is the replicator and gives us producers.
So the picture becomes:-



Such a system, given sufficient source will precipitate a positive feedback event, and masses of agent1s and product will accrue. This is a bit more like what we are looking for, and is quite possible as a non living system. But other modifications are possible, how about the following?

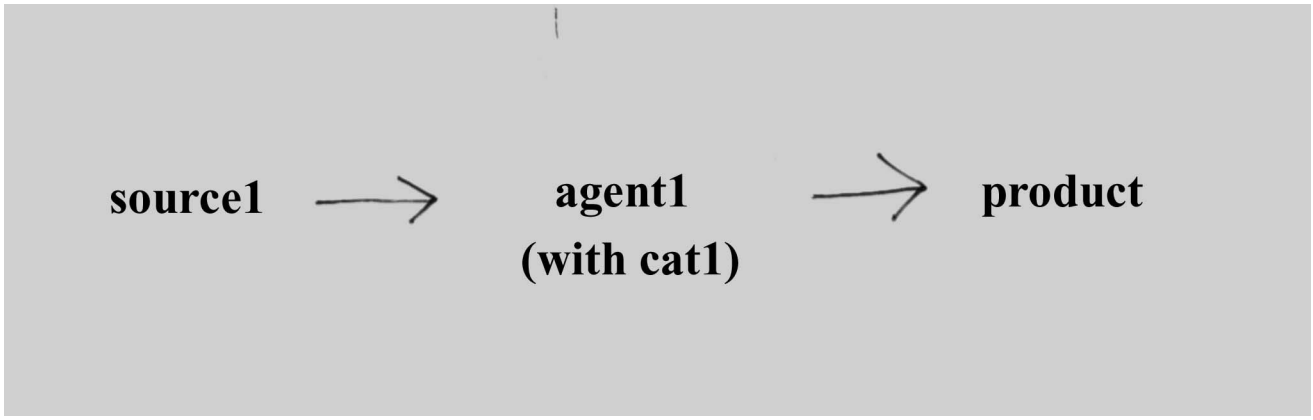


Here we would require sufficient source1 AND source2 to pile up agents and products. Let push it further! In this figure we add in more sources and agents with a similar effect.



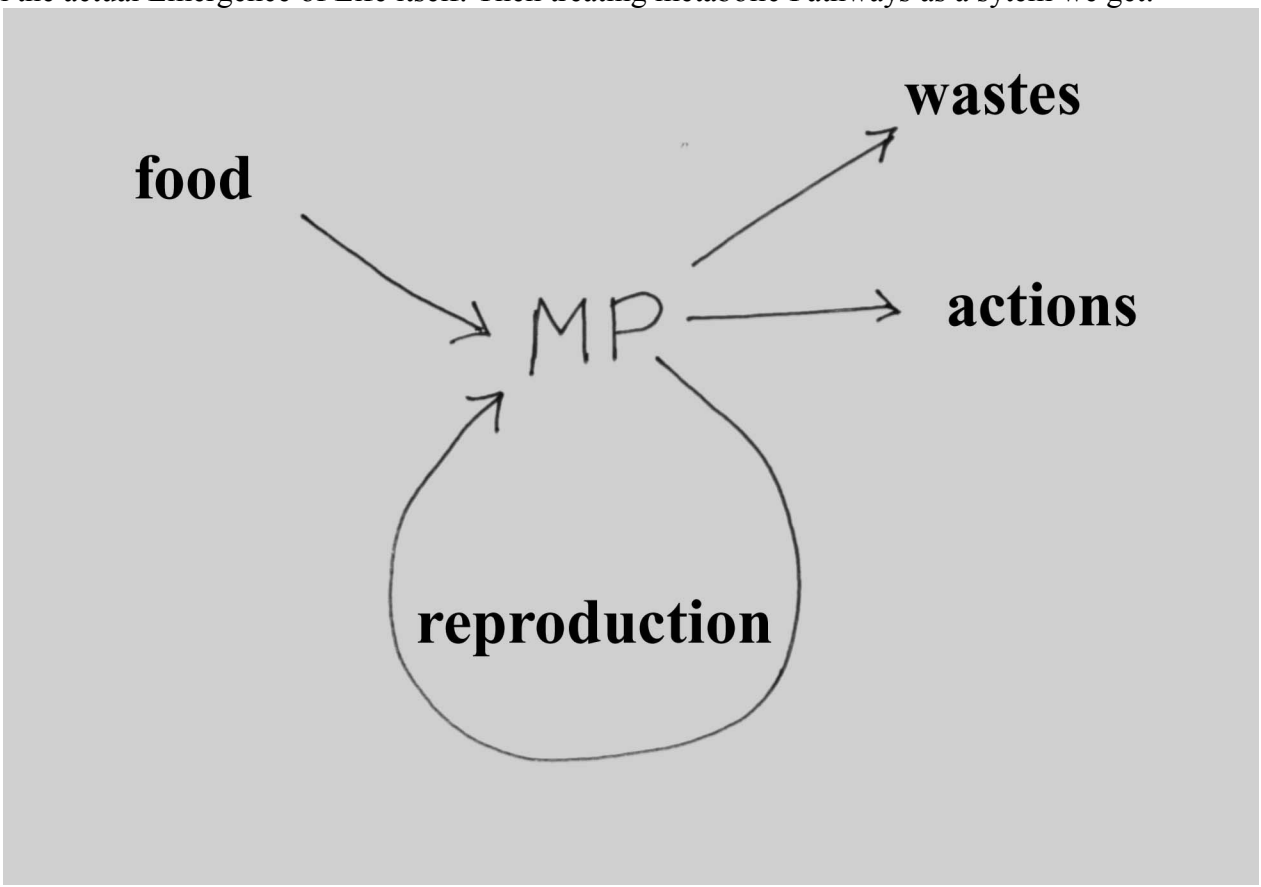
Of course, it doesn't take a genius to consider that the sources themselves may also have been produced as products, and with all these possibilities it is conceivable that cooperating processes, or complementary processes could occur. A whole SET of processes could come together, some supplying source materials, some supplying agents , while others delivered products – all effectively feeding each other in sequences or even LOOPS.

W e could even divide things up still further, so that third parties (termed catalysts) could encourage processes into action, while their absence would cause it to STOP!



And, of course, the catalysts could also be products of other processes.

When we conceive of such a fully integrated system, we don't have to invent it. It already exists as Metabolic Pasthways. Now though these only exist within Living Things, some primitive version MUST have played its part in the actual Emergence of Life itself. Then treating metabolic Pathways as a sytem we get:-



Almost, but not quite, a definition of Life?

(613 words)