On the rails

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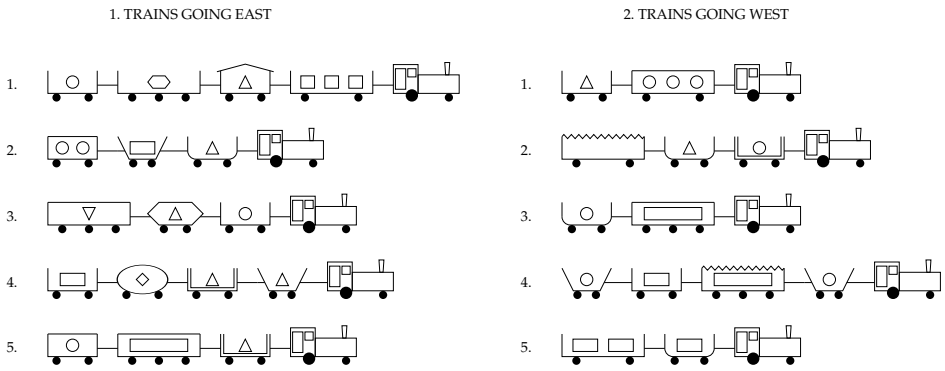
The diagram below originated 20 years ago from Ryszard Michalski, pioneer of the branch of machine learning that digs theories out of data.



As in scientific discovery, it is required to conjecture some plausible Law, in this case governing what kinds of trains are Eastbound and what kinds Westbound.

The newly discovered Law can be tested on fresh observations. If it predicts correctly, it is said to receive corroboration. Otherwise it is scrapped, or alternatively patched up. After Galileo's introduction of the telescope the Ptolemaic theory of the heavens was eventually scrapped, and replaced by one in which the earth goes round the sun.

I published the trains diagram in the computer press over ten years ago. My post-bag contained some neat conjectures from readers, such as:

Theory A: If a train has a short closed car, then it is Eastbound and otherwise Westbound.

Theory B: If a train has two cars, or has a car with a corrugated roof, then it is Westbound and otherwise Eastbound.

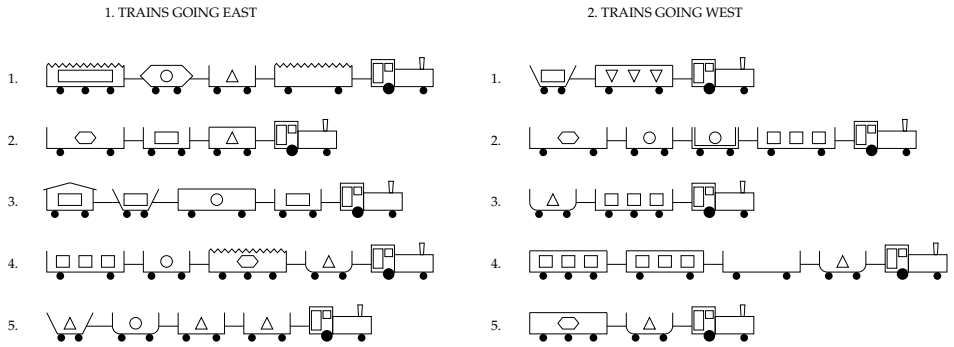
One and the same set of observations can support several different theories. Pending new observations we generally take the simplest and hope for the best. Theory A is marginally simpler than B and a good deal simpler than C from one of my readers:

Theory C: If a train has more than two different kinds of load, then it is Eastbound and otherwise Westbound.

No learning system of those days was capable of coming up with a theory like C, still less one like the following from another reader:

Theory D: For each train add up the total number of sides of loads (taking a circle to have one side). If the answer is a divisor of 60 then the train is Westbound and otherwise Eastbound.

Time has moved on and I have meanwhile observed ten more trains:



Merging these with Michalski's original ten, we note that Theories A, B, C and D all fail. Can the mental ingenuity of Computing readers extract sense from the enlarged sample and give us a new Law, fitting all 20? The best entry, judged on accuracy and simplicity, wins a free copy of Richard Gregory's handsome book The Oxford Companion to the Mind, by kind donation of the Oxford University Press. I will also publish any good Laws of machine authorship. To be in line for a prize the programmers must submit their names and addresses, as must the other entrants.