Stochastic Encyclopedia Article

Stochastic

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Stochastic

Stochastic means involving chance or probability. A stochastic process is one that involves a random **variable** and depends on probability. It is a process that involves random behavior or is subject to probabilistic behavior. A dynamical system is deterministic if the future of that system is completely predictable from knowledge of its present state. If there is some intrinsic randomness in the system it makes the perfect prediction of the future of that system impossible and so it is considered a stochastic system. There may exist strong trends or correlations in such systems but there is always some element of uncertainty.

The word stochastic is derived from the Greek *stokhastikos* which is derived from *stokhos* meaning aim or goal. This word was originally derived from an Indo-European word, *stegh*, that is also the ancestor of the English word.

Stochastic **calculus** involves **functions** that contain a random variable or variables. Ordinary **differential equations** are normally interpreted as determining dynamical systems since they often describe evolution in time. These functions are deterministic, completely predictable, but there are circumstances where there is some intrinsic randomness and understanding these systems would involve stochastic calculus. Some stochastic processes can be called Markov processes if certain constraints are upheld.