This paper presents a model describing the evolution of preferences as a stochastic process. These preferences are represented by weak orders, i.e., rankings with possible ties, on a set of alternatives, and can be modified under the influence of 'tokens' of information delivered by the environment according to a stochastic mechanism. The parameters of this mechanism can be estimated from the data and are descriptive of the environment. The potential effect of a token is to move an alternative up or down in an agent's ranking. Attitude change is modeled by the stepwise transitions between the weak orders, which takes the form of a Markov process. The model permits exact predictions (up to a small number of parameters) of panel data in which the judges have been required to repeatedly evaluate the alternatives at items t1,...,tn. An illustrative application of this model is described in a companion paper (Regenwetter, Falmagne and Grofman, 1995.) That illustration uses NES Thermometer (Rating) data on the 1992 presidential candidates.