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Matching Law in Autoshaped Choice in Neural Networks

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Abstract : The objective of this work was to study the autoshaped choice behavior in the Donahoe, Burgos and Palmer (DBP) neural network model and analyze it under the matching law. Autoshaped choice can be viewed as a form of economic behavior defined as the preference between alternatives according to their relative outcomes. The Donahoe, Burgos and Palmer (DBP) model is a connectionist proposal that unifies operant and Pavlovian conditioning. This model has been used for more than three decades as a neurobehavioral explanation of conditioning phenomena, as well as a generator of predictions suitable for experimental testing with non-human animals and humans. The study consisted of different simulations in which, in each one, a ratio of reinforcement was established for two alternatives, and the responses (i.e., activations) in each of them were measured. Choice studies with animals have demonstrated that the data generally conform closely to the generalized matching law equation, which states that the response ratio equals proportionally to the reinforcement ratio; therefore, it was expected to find similar results with the neural networks of the Donahoe, Burgos and Palmer (DBP) model since these networks have simulated and predicted various conditioning phenomena. The results were analyzed by the generalized matching law equation, and it was observed that under some contingencies, the data from the networks adjusted approximately to what was established by the equation. Implications and limitations are discussed.

Keywords : matching law, neural networks, computational models, behavioral sciences
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