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Comparative Connectionism: Study of the Biological Constraints of Learning Through the Manipulation of Various Architectures in a Neural Network Model under the Biological Principle of the Correlation Between Structure and Function

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Abstract : The main objective of this research was to explore the role of neural network architectures in simulating behavioral phenomena as a potential explanation for selective associations, specifically related to biological constraints on learning. Biological constraints on learning refer to the limitations observed in conditioning procedures, where learning is expected to occur. The study involved simulations of five different experiments exploring various phenomena and sources of biological constraints in learning. These simulations included the interaction between response and reinforcer, stimulus and reinforcer, specificity of stimulus-reinforcer associations, species differences, neuroanatomical constraints, and learning in uncontrolled conditions. The overall results demonstrated that by manipulating neural network architectures, conditions can be created to model and explain diverse biological constraints frequently reported in comparative psychology literature as learning typicities. Additionally, the simulations offer predictive content worthy of experimental testing in the pursuit of new discoveries regarding the specificity of learning. The implications and limitations of these findings are discussed. Finally, it is suggested that this research could inaugurate a line of inquiry involving the use of neural networks to study biological factors in behavior, fostering the development of more ethical and precise research practices.

Keywords : comparative psychology, connectionism, conditioning, experimental analysis of behavior, neural networks
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