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Paper Title:	On the Information Coding with Retinal Neuromorphic Spikes Toward the Spike-Based Microstimulation in Intra-Cortical Visual Prostheses
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Abstract

We have recently proposed to employ the timing sequences of retinal neuromorphic spikes for the microstimulation pulses in intracortical visual prostheses. The dynamics of retinal information encoding can be partially explained using a combination of spatiotemporal linear filtering and static nonlinear scaling along with a spiking model. The Izhikevich spiking model was employed in our previous study, enabling us to simulate the biological post-spike refractoriness that improves spike timing precision and reduces the variance-to-mean ratio of spike counts within a time window. However, there has been little investigation into how post-spike refractoriness affects the decodability of spike sequences into visual information. In this study, we used a 3-dimensional convolutional neural network model, that was pre-trained to decode the retinal neuromorphic spikes into neural images, to compare the decoding property with the spikes computed with varying post-spike refractoriness in the Izhikevich model.