Deep Neural Networks (DNNs) applied in computer vision are often compared to the hierarchical architecture of the ventral stream; but they typically disregard the temporal dynamics experimentally observed in the visual system. Alpha oscillations (8-12 Hz), for instance, are known to dominate the temporal dynamics of the human visual system. These oscillations have been suggested to organize visual inputs into a temporal code by means of pulsed inhibition (Jensen et al., 2014, 2021). They could therefore play a key role for multiplexing in the visual system. We have recently demonstrated that incorporating feedforward dynamics and pulsed inhibition into a shallow neural network allows a successive read-out of competing inputs, ordered according to the input gain (Duecker, Idiart and Jensen, 2021, MAIN meeting). The aim of the current project is to expand upon this work, by implementing these dynamics into CORnet-Z, a DNN whose activations map to the ventral stream (Kubilius et al., 2018). The interim goal of this project is to extend CORnet-Z by extending the network’s decoder by one fully connected layer and training the new decoder using stochastic gradient descent, while holding the weights of the existing CORnet-Z layers constant. As done previously, semi-realistic temporal dynamics and pulsed inhibition will be added to the new layer post-training. This project will be an important step in building a deep convolutional NN with semi-realistic dynamics in each layer; with the aim to enable multiplexing of complex images.