Conclusions

This work gives new evidence for several characteristics of the honeybee olfactory system. We show that odors are encoded in complex spatio-temporal patterns, which reflect the chemical similarity between different odors. PN activity increases with concentration, changing the activity patterns without changing the relative similarity between patterns elicited by different odors. This information is redundantly encoded in the antennal lobe PN activity, and therefore might still be present, when the AL is partially damaged. Even further, it is maintained throughout further processing in higher order brain centers. As a result, perceptual odor similarity can be considered as a function of the similarity between active PN ensembles.