

Bernstein Network Computational Neuroscience

Bernstein Newsletter



Recent Publications

*Communication without detours –
A bad song turns off*



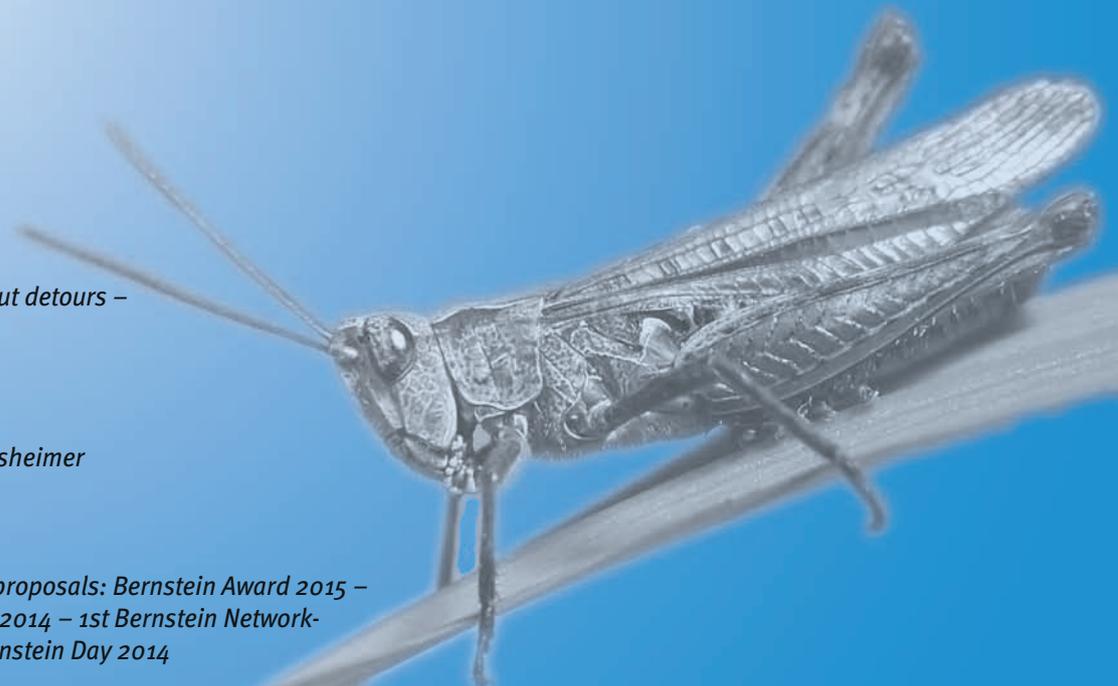
Meet the Scientist

Raoul-Martin Memmesheimer



News and Events

*Personalia – Call for proposals: Bernstein Award 2015 –
Bernstein Conference 2014 – 1st Bernstein Network-
DZNE Workshop – Bernstein Day 2014*





RECENT PUBLICATIONS

A bad song turns off

Which mating partner is the best? To answer this difficult question, female grasshoppers base their decision on the singing skills of their male conspecifics. In the process, the quality of bad singers has much bigger weight than the one of good singers. The latter has a negligible influence on the decision of females. This is the result of a study by researchers lead by Bernhard Ronacher at the Bernstein Center Berlin and the Humboldt-Universität in Berlin. The scientists point out that their research results are consistent with current theories of sexual selection: it helps females to avoid time and cost-intensive contacts with unsuitable mating partners—such as with males of other species, which have distinct calling songs.

For the study, the researchers presented female grasshoppers with male calling songs in a sound-isolated chamber. When a female likes a song, it produces a response, which in turn encourages the male in its courtship behavior. “The animals evaluate song subunits with a more or less constant volume as being most attractive”, explains Jan Clemens, first author of the study. The scientists presented both attractive and non-attractive calling songs to the animals and recorded the female responses to investigate the decision process in the animals.

“We found that especially the beginning of a song has a strong influence on the response of the females,” says Clemens. This could mean that grasshopper females are easily coerced into mating with a male after a few good syllables—which contradicts current theories of sexual selection, however. These postulate that females should be choosy and should therefore evaluate well if the males may produce good songs over a longer time period, too.

To unravel the dynamics of decision making in more detail, the researchers analyzed their data using a computational mod-



A grasshopper of the species Chorthippus biguttulus, which the scientists examined in the study. © Monika Eberhard, 2014

el. This model allowed them to consider further parameters in the analysis of the behavioral data, such as the weight of sensory information in the decision process, or the internal decision threshold of the animal.

“Interestingly, this model provided us with a very different explanation: a bad song has much more weight than a good one during the decision making process. This interpretation is far more consistent with current theories of sexual selection, since it helps to prevent disadvantageous mate choices,” says Clemens. The neuroscientist alludes to the expanded analysis opportunities of computational models. It was the model that helped them to disentangle the behavior of female grasshoppers and revealed that the animals are not reacting impulsively to good songs but rather selectively reject “bad” ones.

[Clemens J, Krämer S, Ronacher B \(2014\): Asymmetrical integration of sensory information during mating decisions in grasshoppers. PNAS, advanced online publication doi: 10.1073/pnas.1412741111](#)