

# Der Singvogel – Wie funktioniert vokales Lernen im Gehirn ?



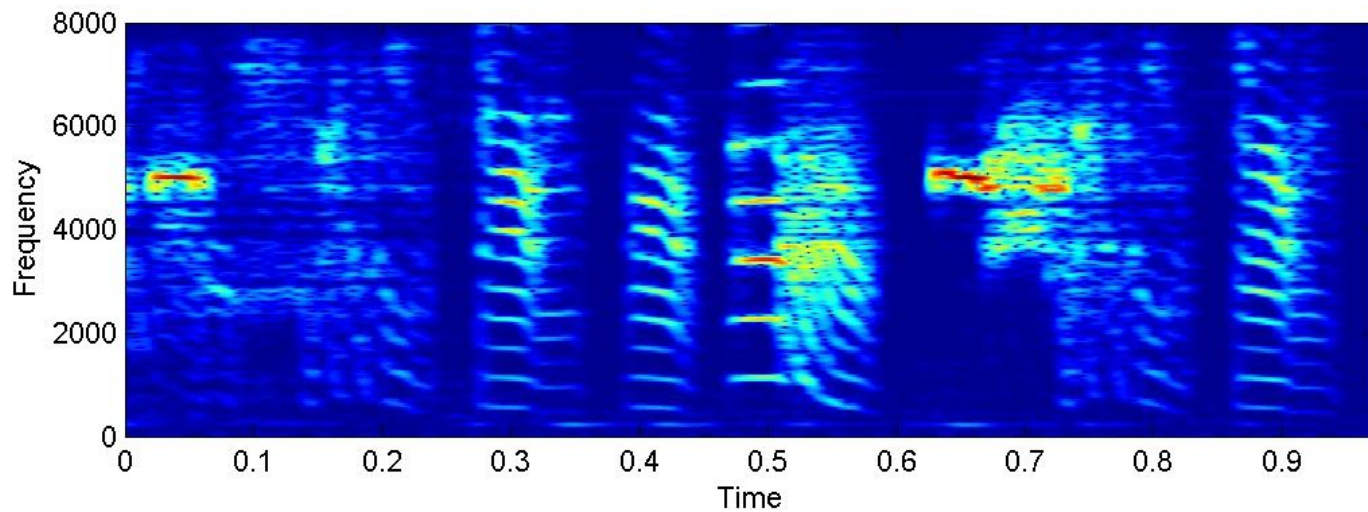
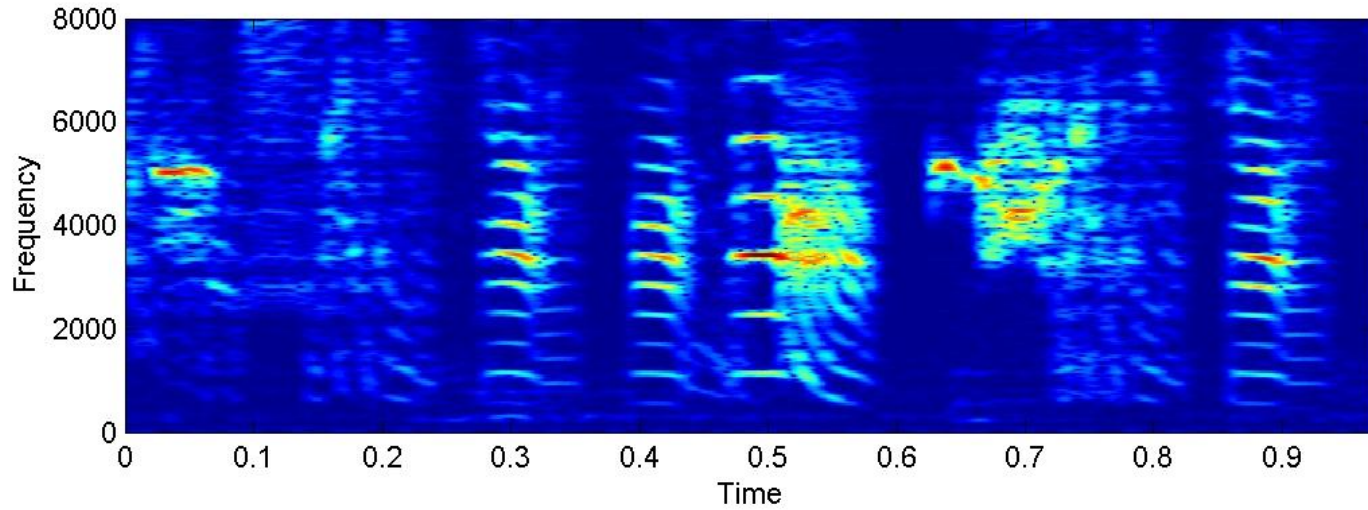
Richard Hahnloser

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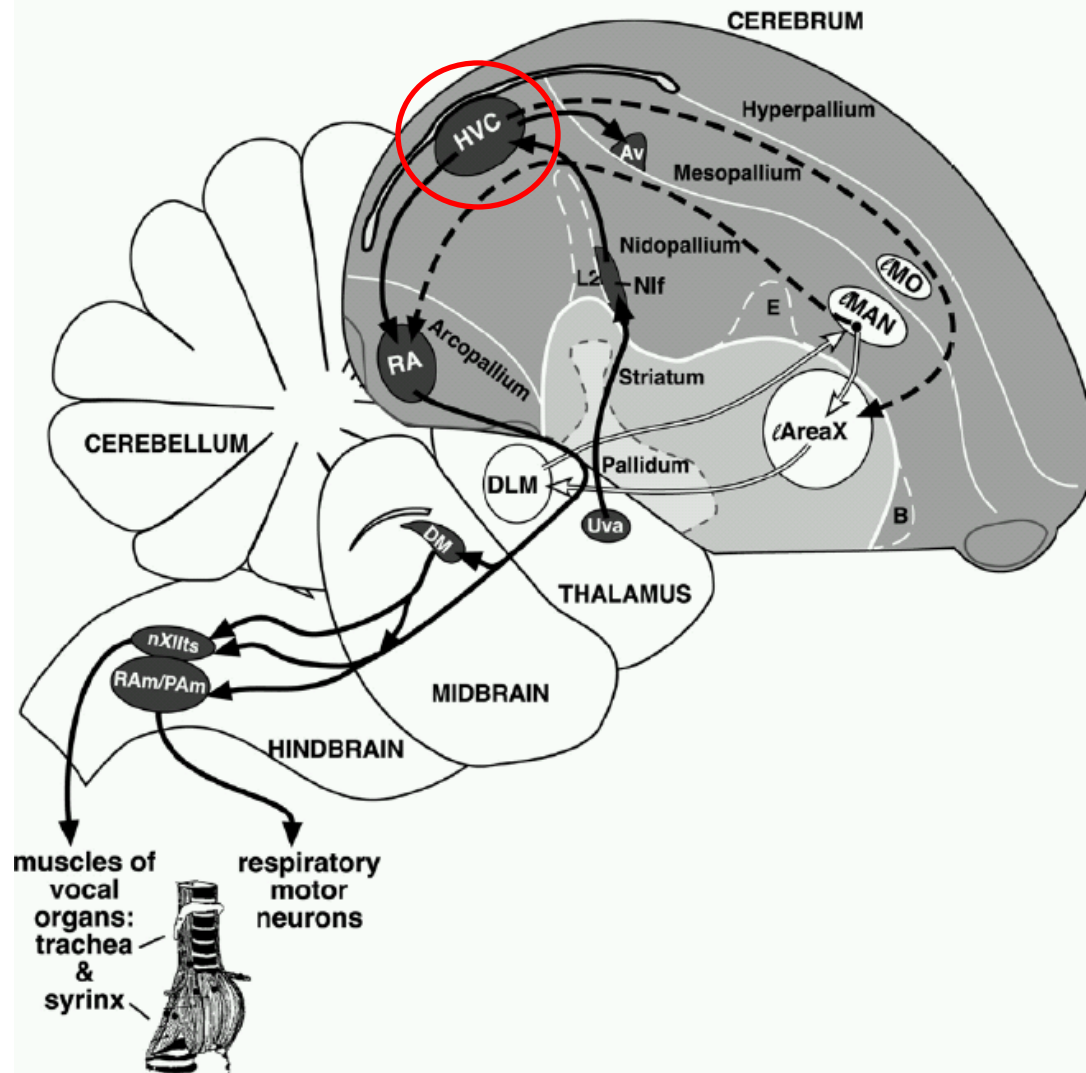
# Zebrafinken



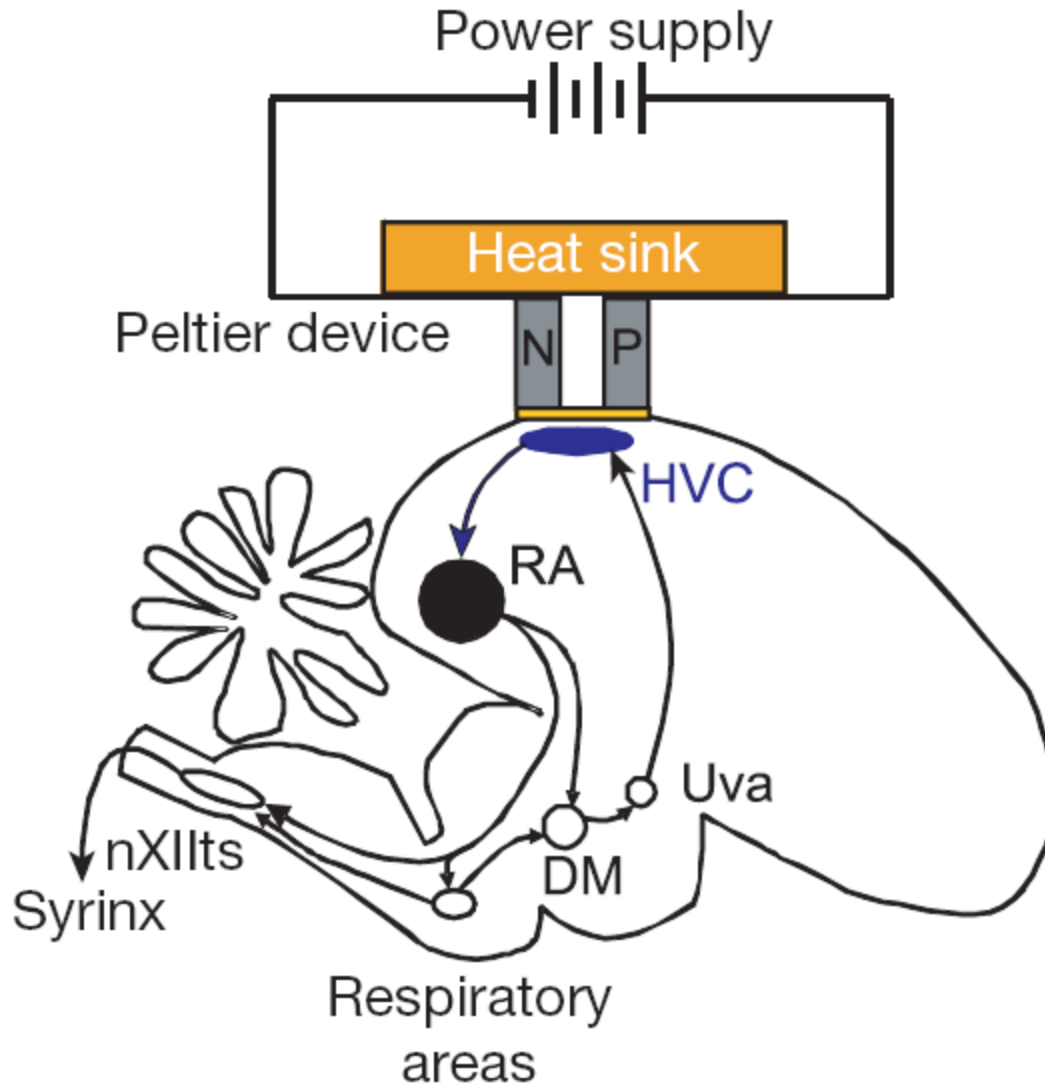
# Stereotyper Gesang

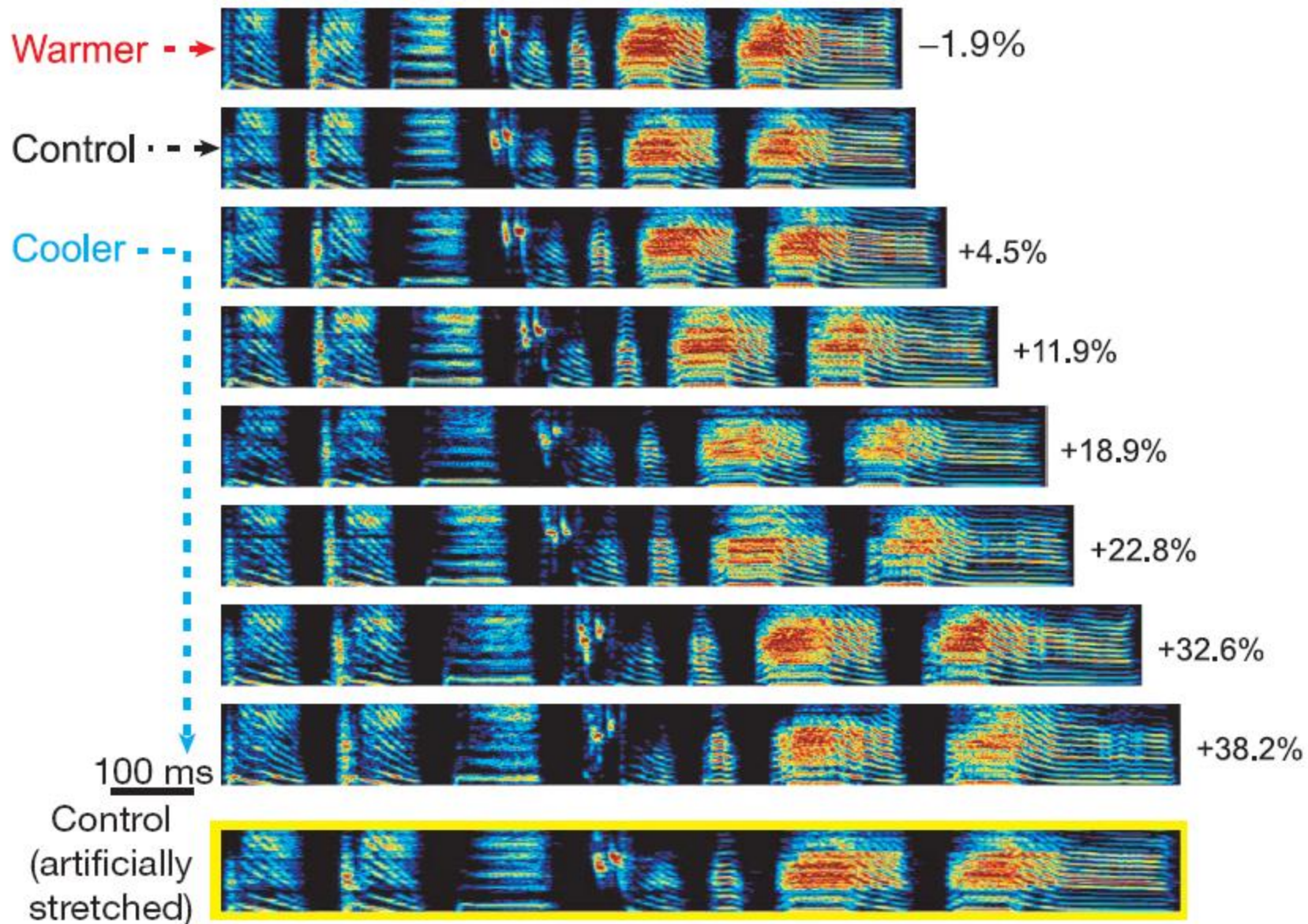


# Die motorischen Areale



# HVC kühlen





# Lernphasen des Vogelgesangs



1. Sensorische Phase

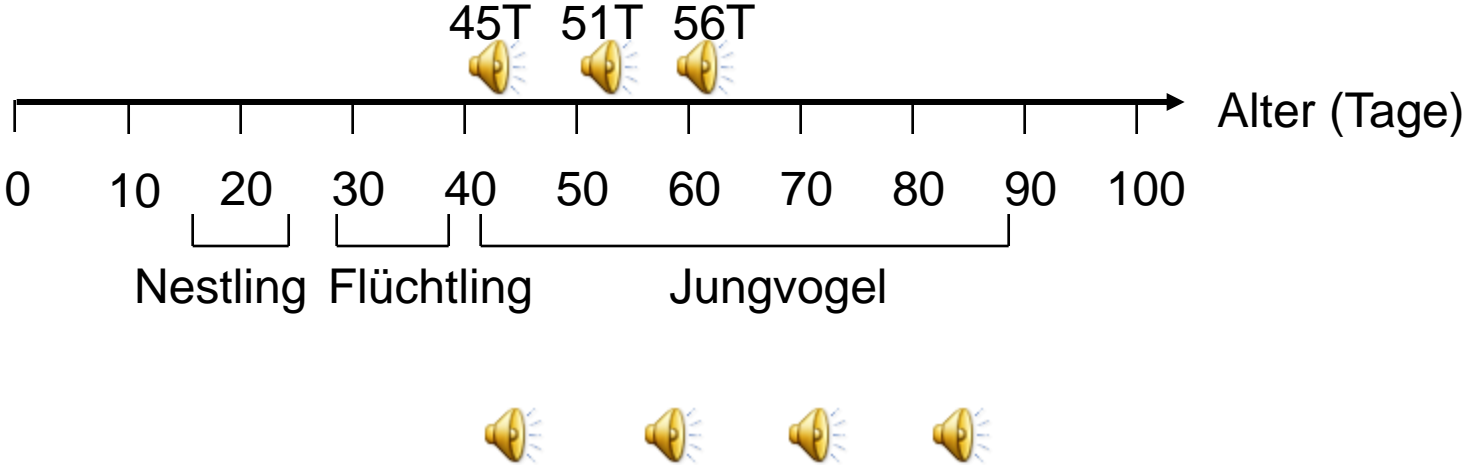


Tutor 

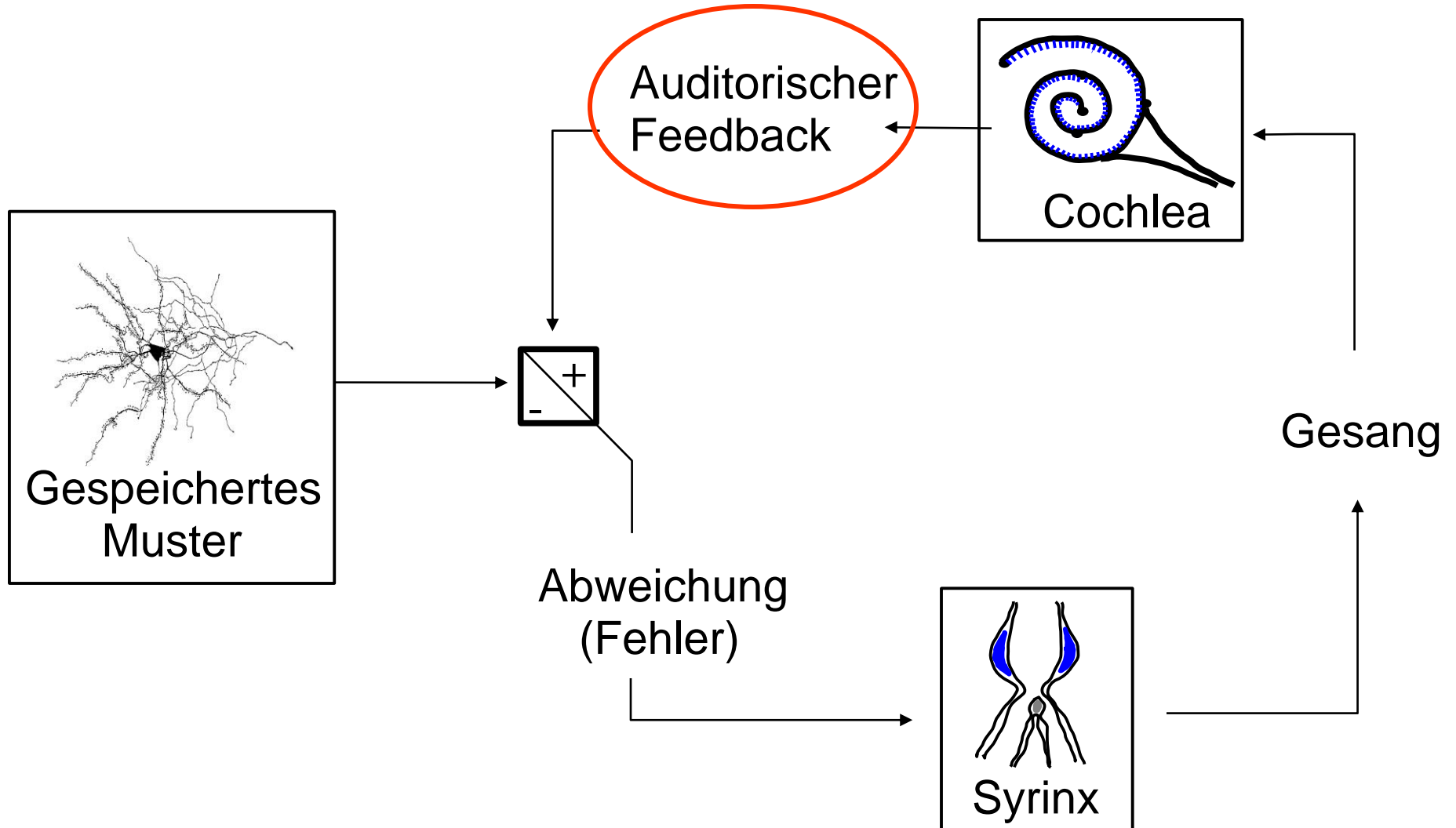
2. Sensorimotorische Phase



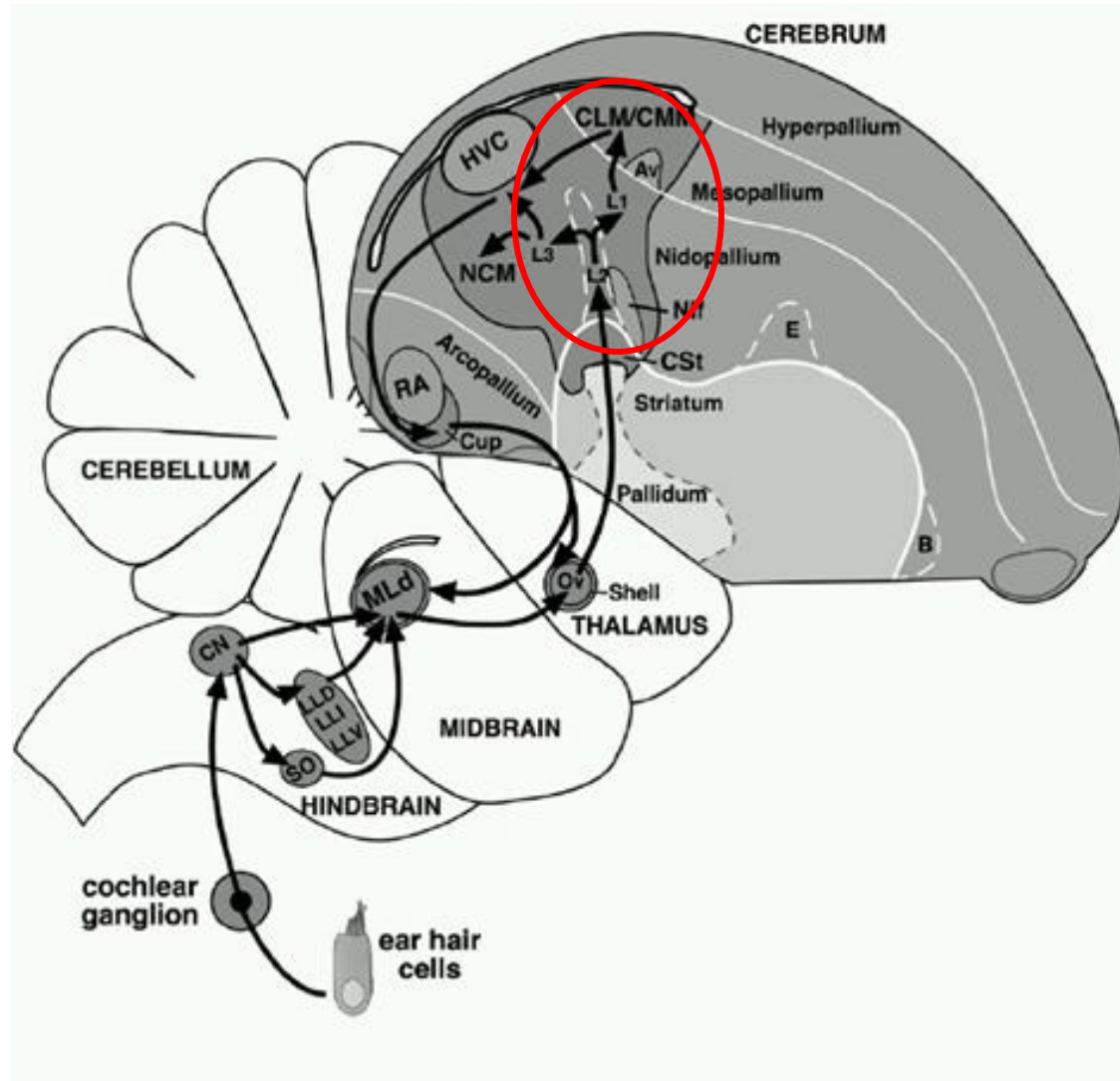
Subgesang Plastischer Gesang Kristallisierter Gesang



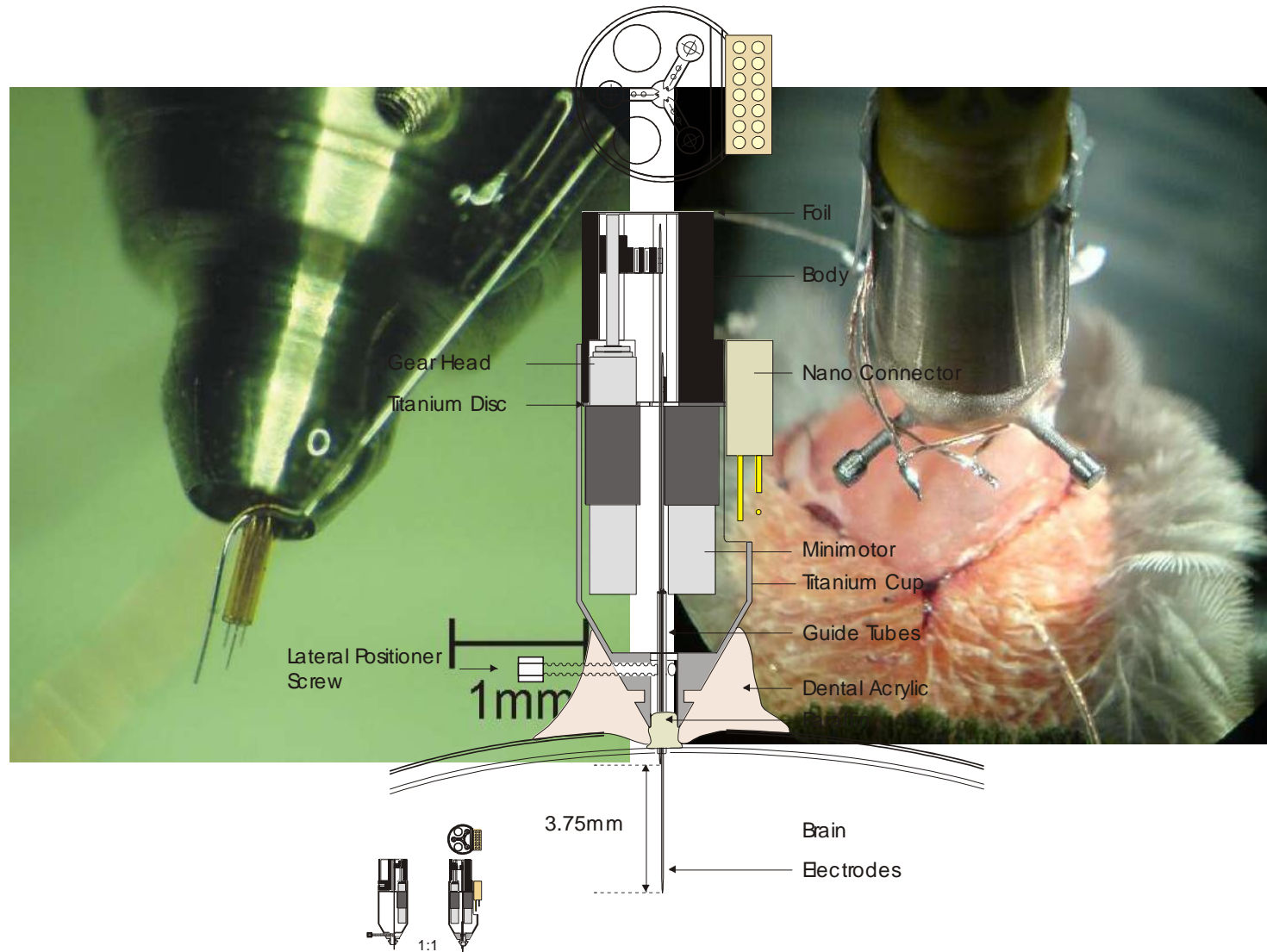
# Mustertheorie des Gesanglernens



# Der auditorische Pfad



# Chronische Ableitung einzelner Zellen



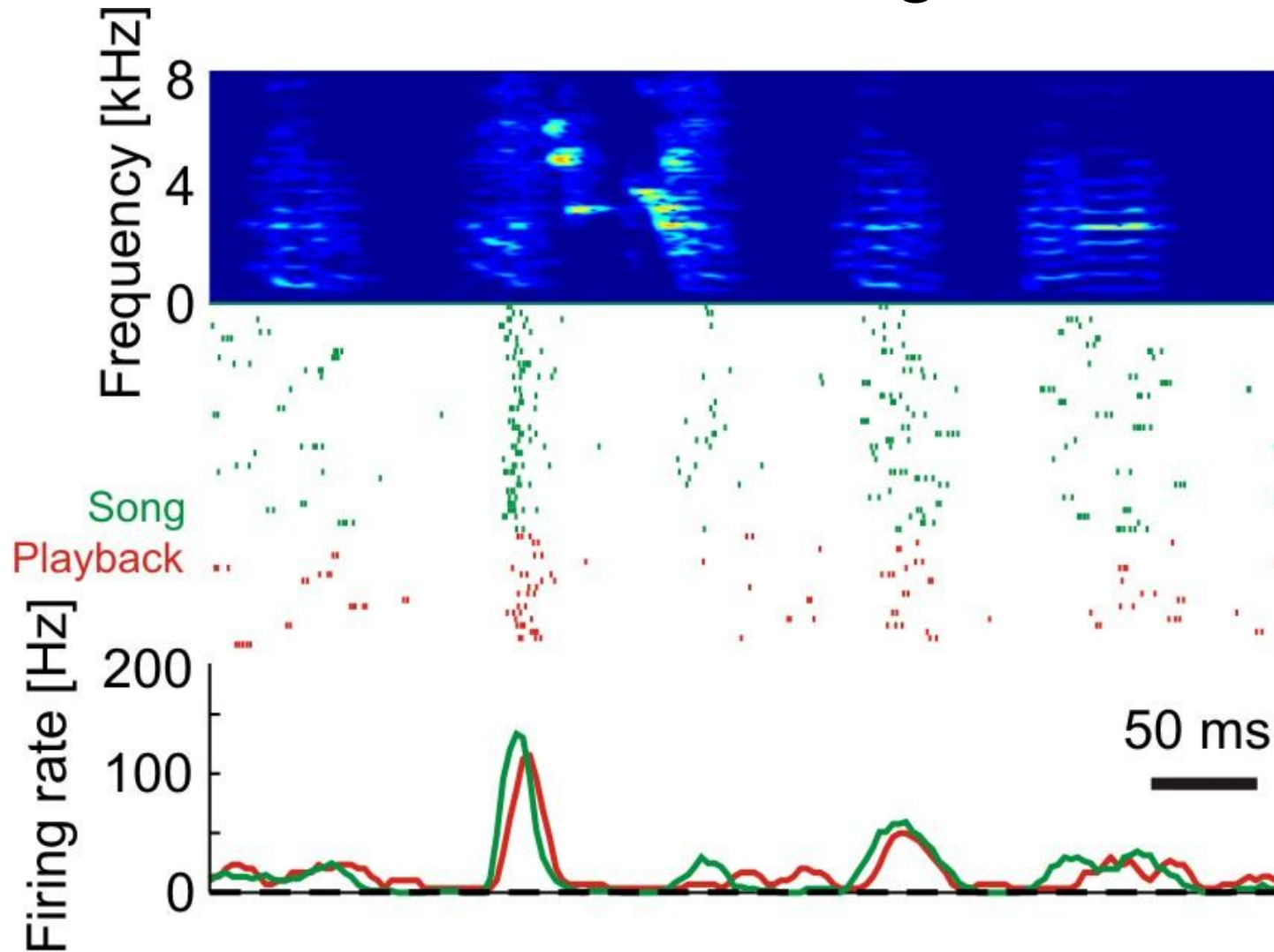


# Verarbeitung der auditorischen Rückkopplung (Feedback)

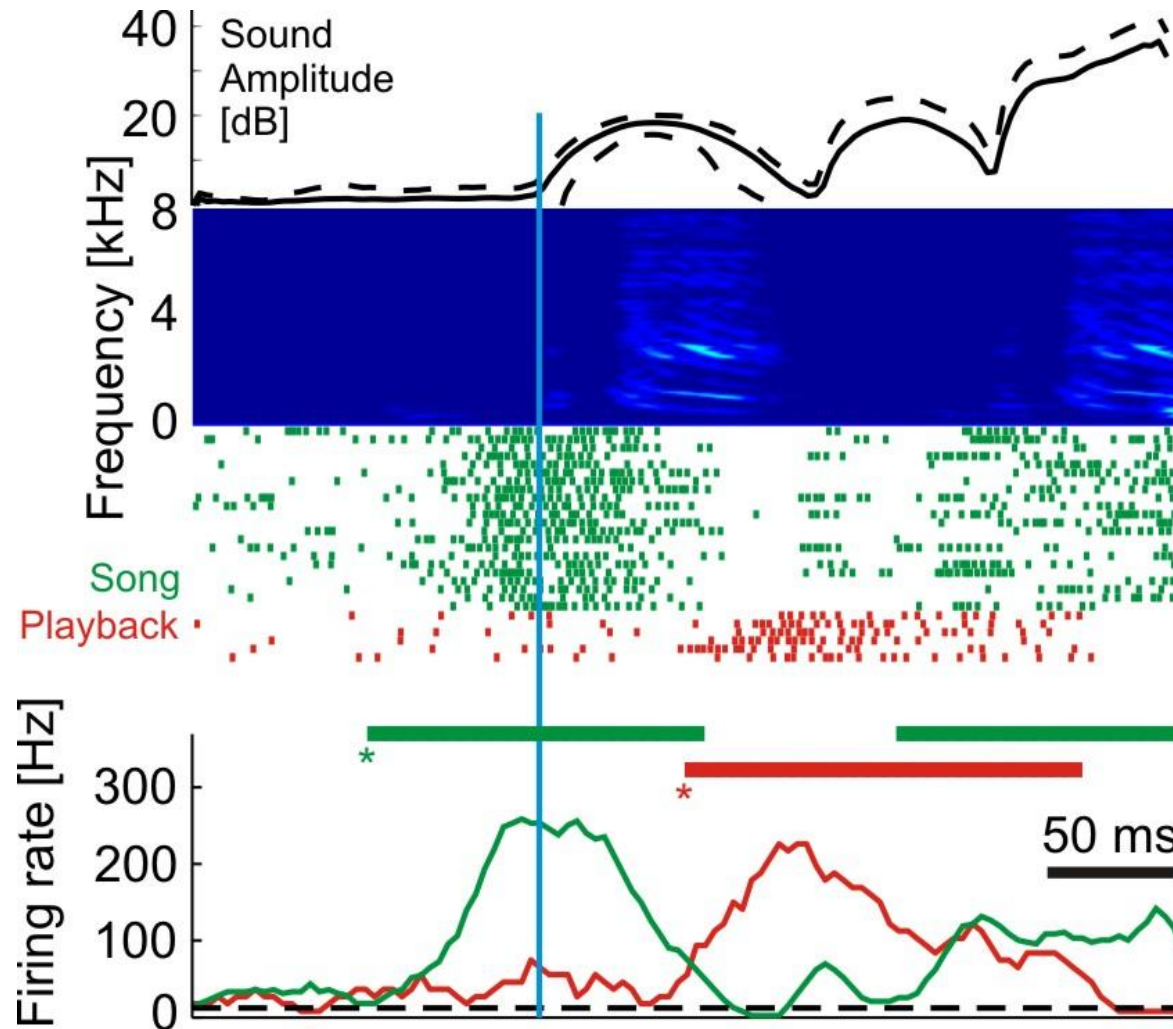


Georg Keller

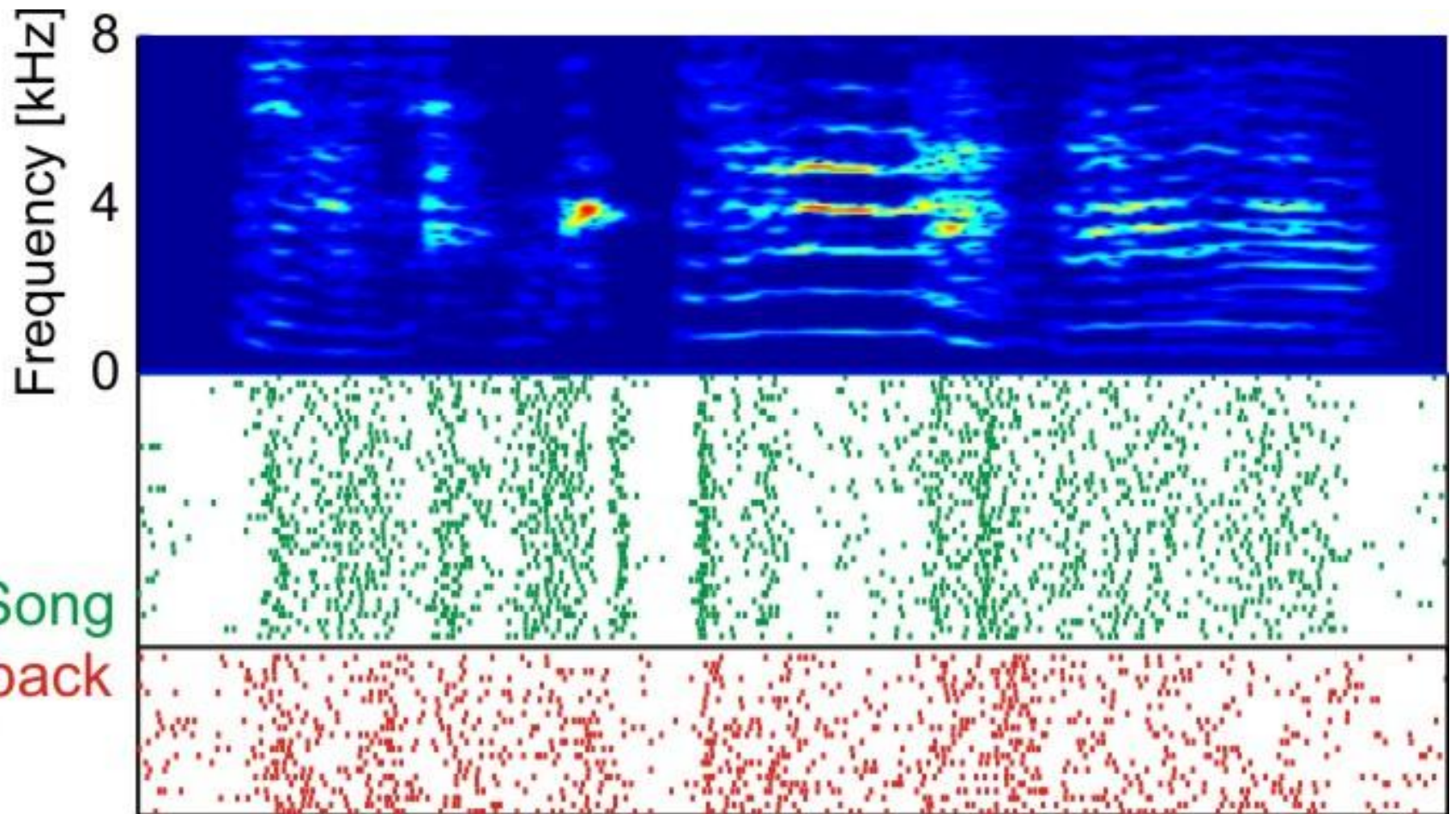
# Aktive and passive auditorische Verarbeitung



# Aktionspotentiale vor dem Gesang

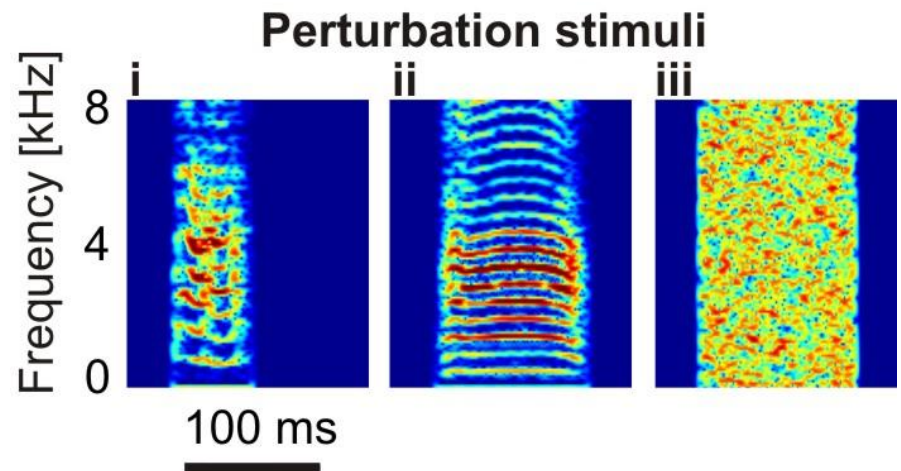
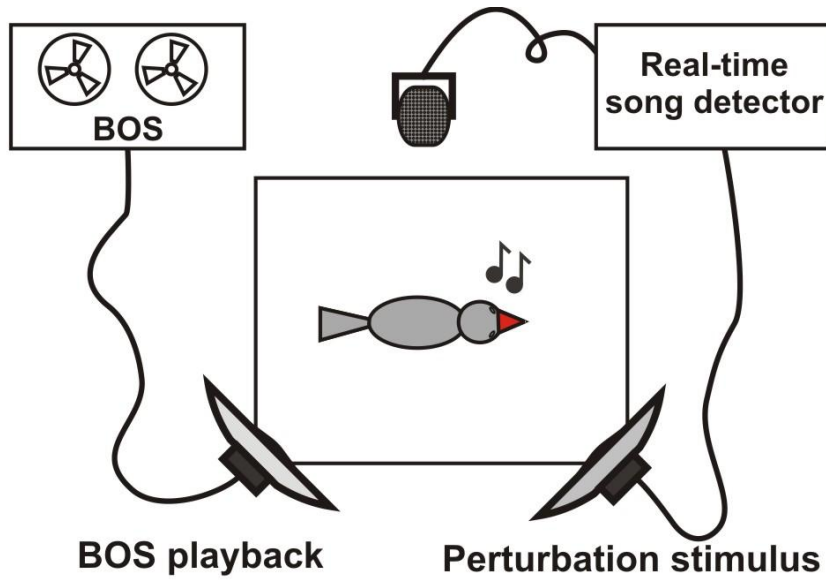


# Höhere Stereotypie während des Gesangs

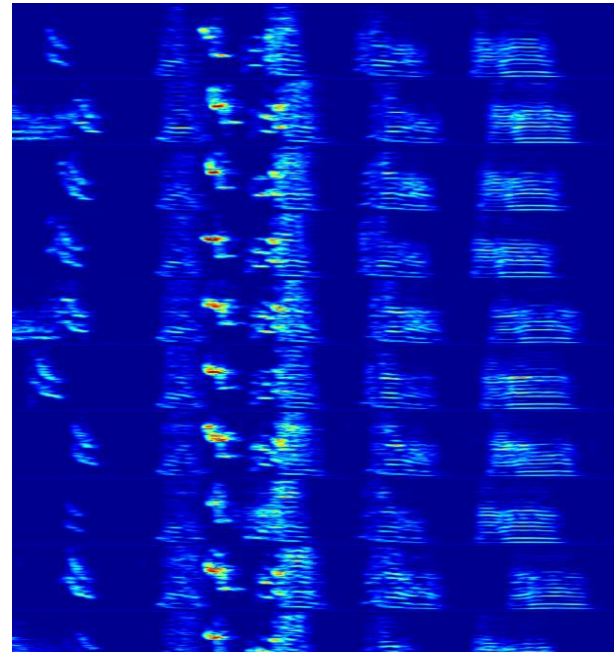


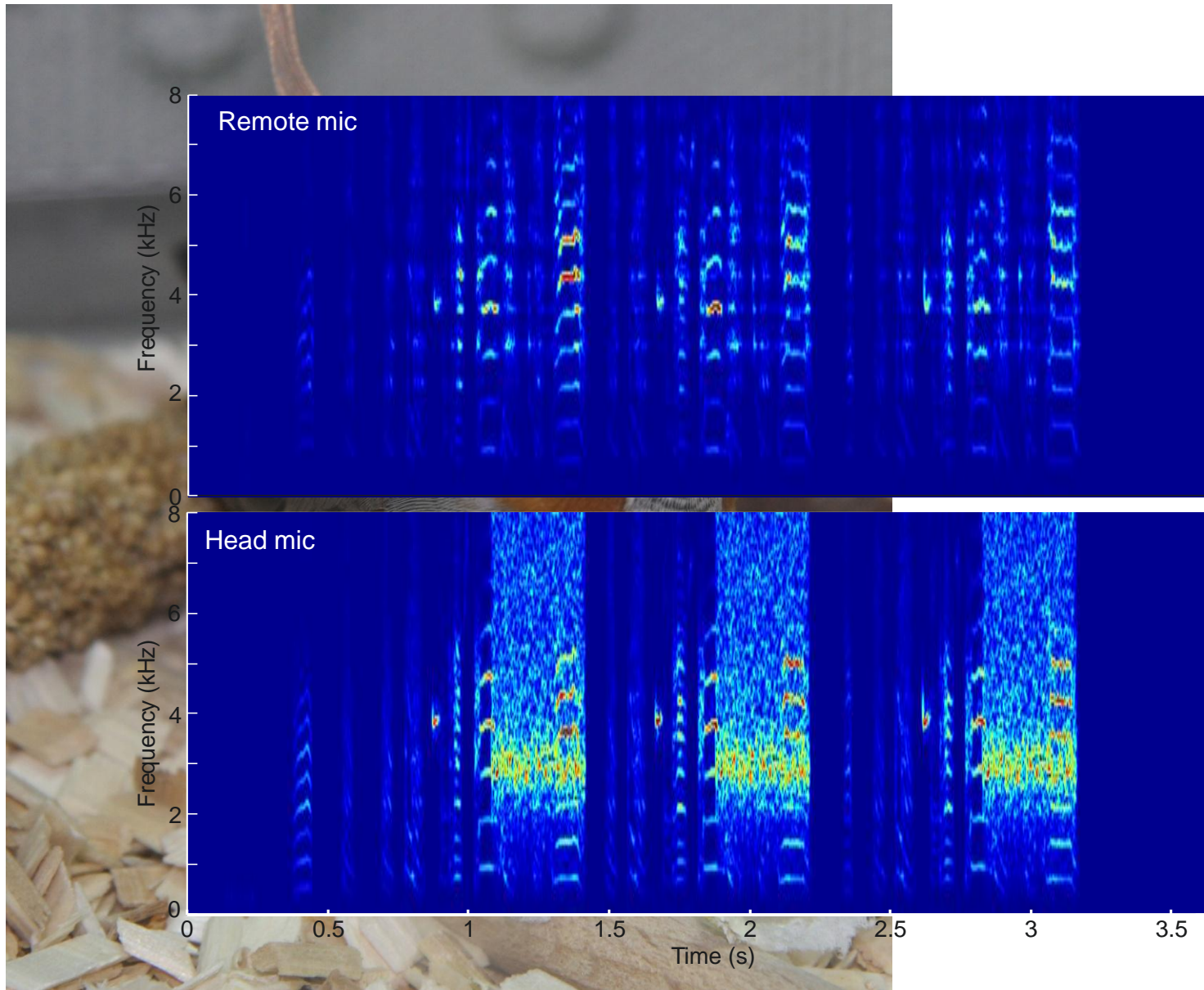
# Gestörte auditorische Rückkopplung

# Störstimuli

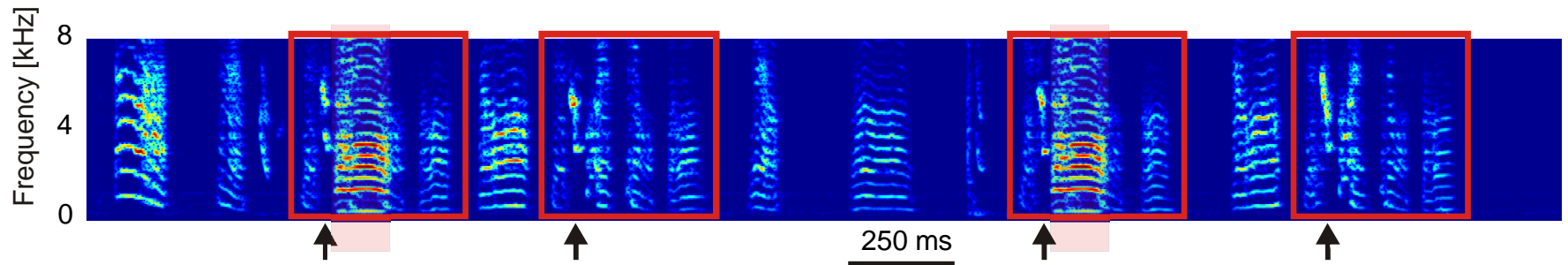


Gestörte Gesangsmotive  
sind stereotyp

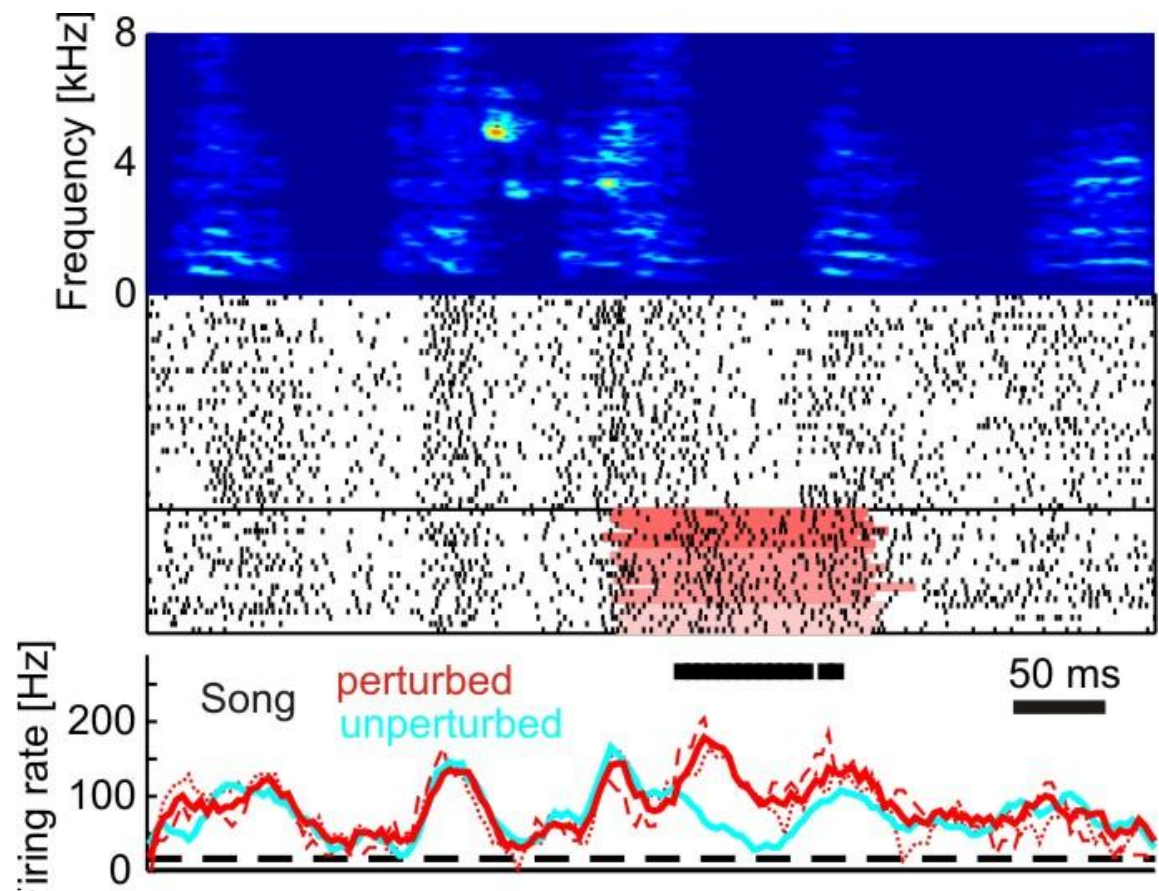




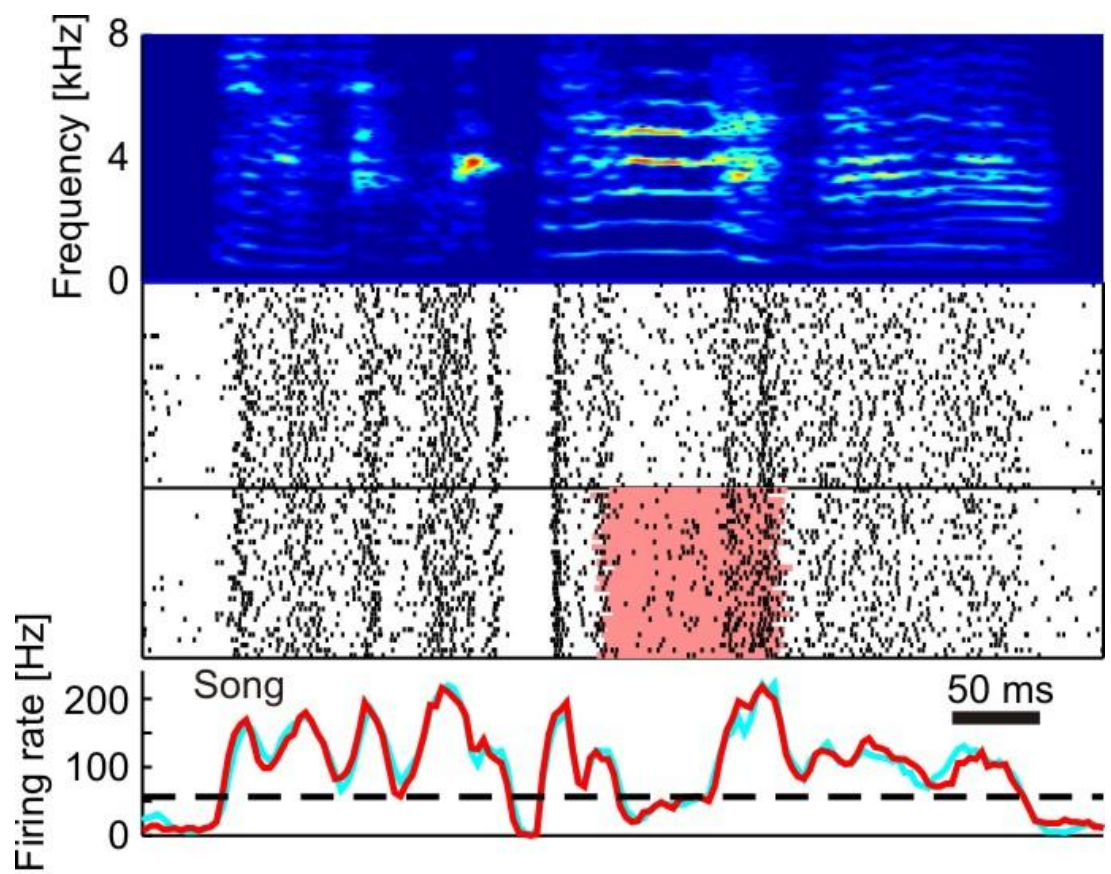
# Beispiel einer extrazellulären Aufnahme in Field L



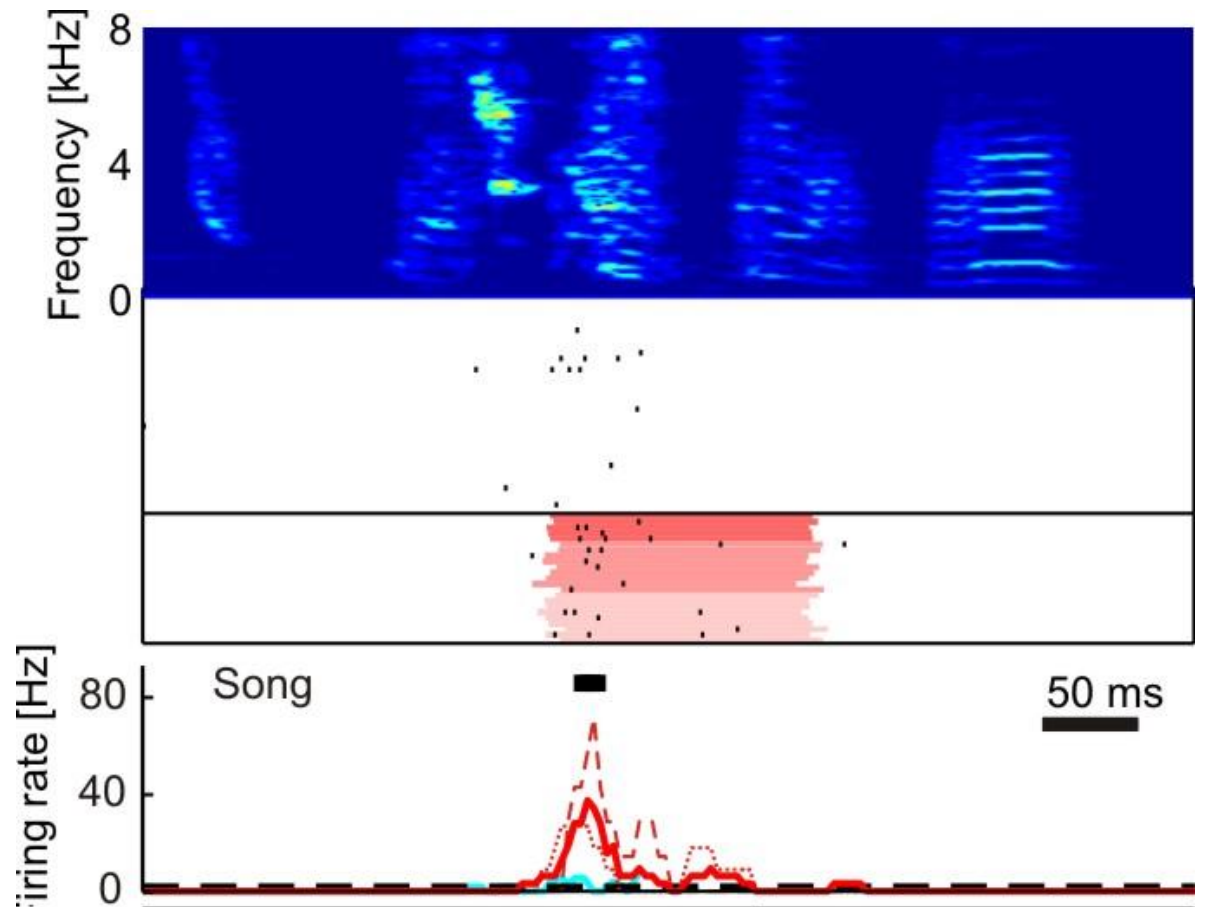
# Einfaches auditorisches Neuron



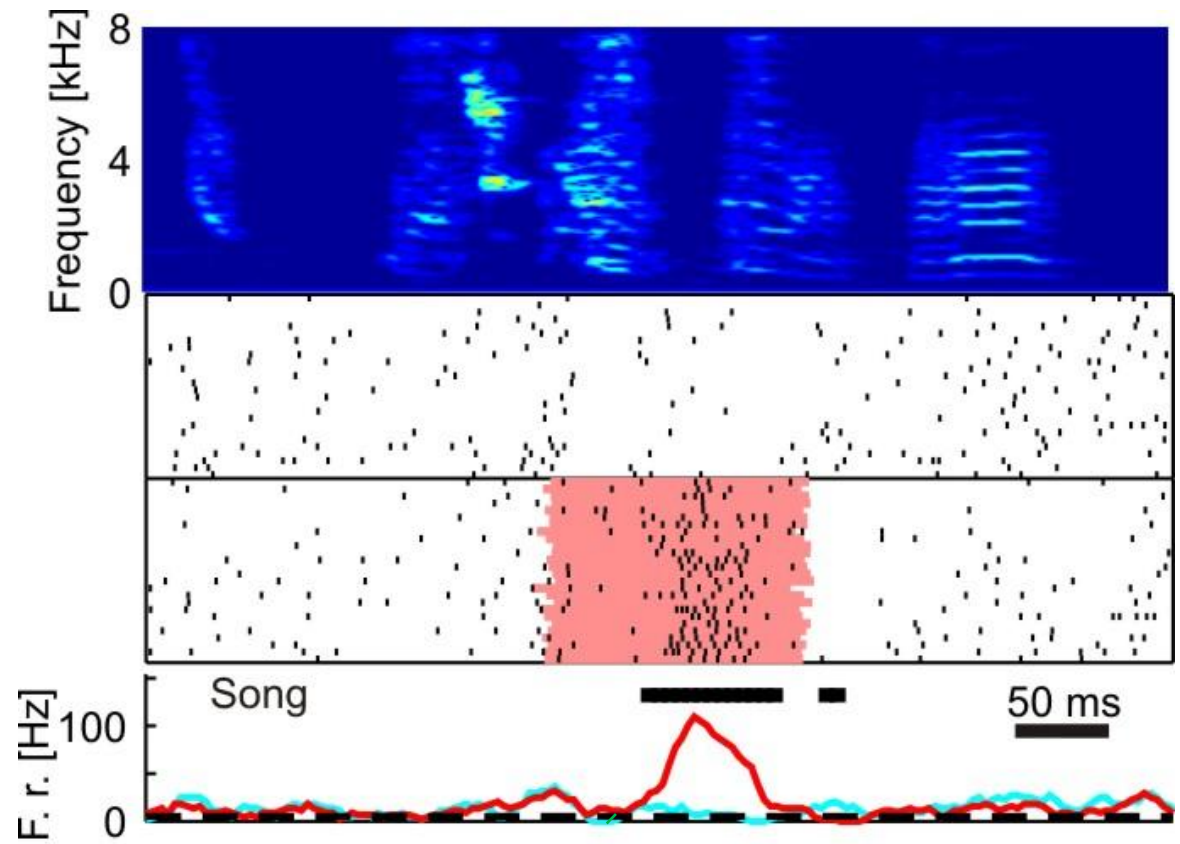
# Feedback unsensibles Neuron



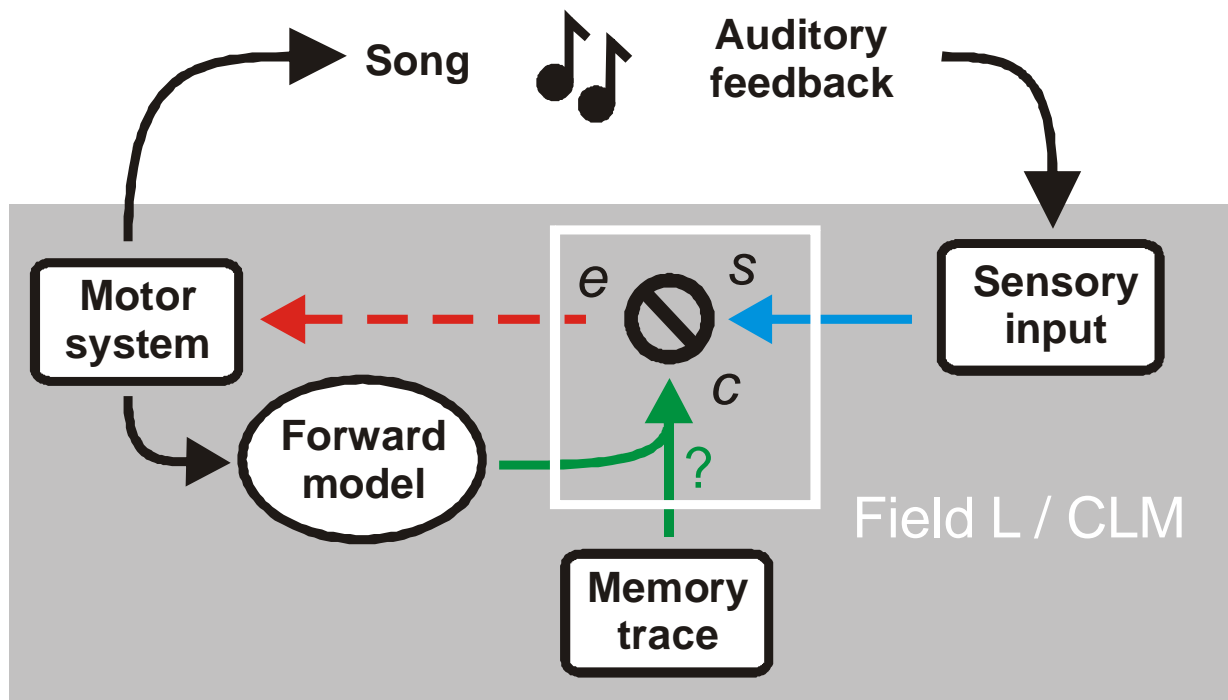
# Stark Feedback sensibles Neuron



# Stark Feedback sensibles Neuron



# Zwei mögliche interne Modelle



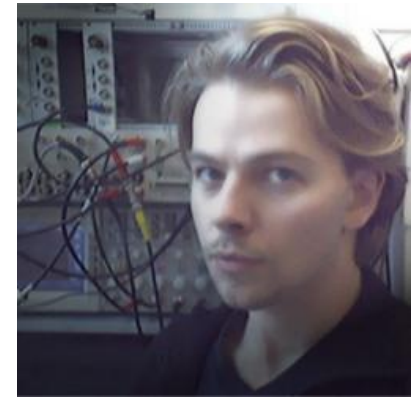
# Danksagung



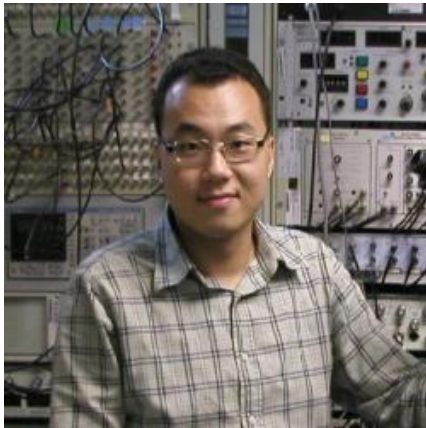
Georg Keller



Daniele Oberti



Aymeric Nager



Claude Wang

## Externe Mitarbeiter

- Michale Fee (MIT)
- Ila Fiete (Caltech)
- Constance Scharff (FU Berlin)
- Walter Senn (UNIBE)



Moritz Kirschmann

Schweizer Nationalfond