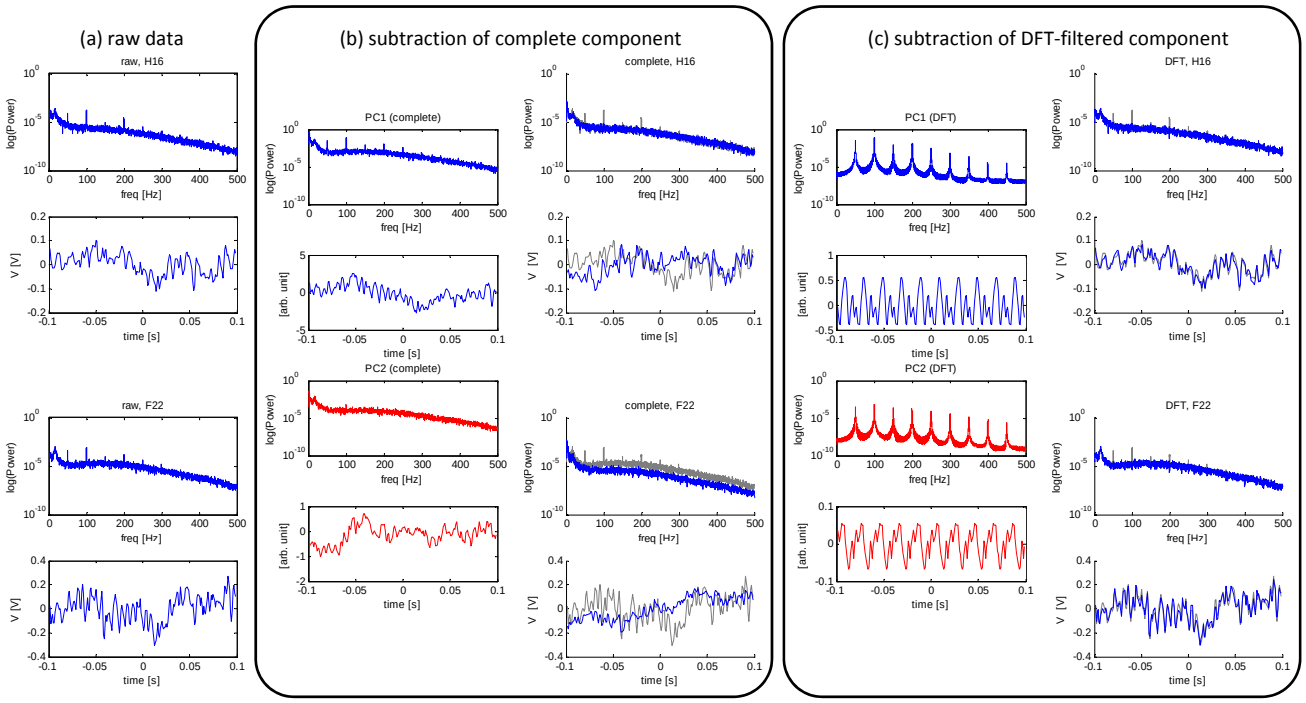

Figure S1. *Effect of cleaning 50Hz power-line noise by component subtraction from data.*
(a) Properties of two exemplar channels of the raw data. For each channel, the power spectrum over many trials and an example time course of 0.2 seconds is shown.
(b) Left: Power spectra and time courses of the 1st and 2nd principle components (PC). The components were estimated on 50Hz filtered data, but the plots here show the power spectra and the time courses calculated for the same components on the unfiltered data. Only the first two PCs are shown, because from the 3rd PC onwards no 50Hz noise peaks (or harmonics, i.e. 100Hz, 150Hz, etc.) can be seen. Note that both power spectra and time courses show significant influence of non-noise components. Right: As in (a). Blue lines show power spectra and time courses for the same two exemplar channels after subtracting the two components. Grey lines show everything before subtraction for easier comparison. Although the 50Hz and harmonic peaks are gone, power spectra and time courses of both electrodes show clear differences unrelated to the power-line noise.
(c) As in (b), but the time courses of the two components were band-pass filtered for 50Hz (and harmonics) using DFT-filters before subtraction from the data. One can clearly see the development and the regularity of the power-line noise in the time courses of the components (very similar results are seen if other band-pass filters are used). Power spectra and time courses of the exemplar channels are nearly identical, the only differences are the fact that all 50Hz and harmonic peaks are gone.
Note: Although we apply the method here for 50Hz power-line noise removal, band-pass filtering noise components before removal might in general reduce unwanted subtraction for any kind of noise for which the spectral signature is known (e.g. muscle artefacts, eye movements, and the like). For the current example, we used a dataset for which ICA failed to separate the noise into one or few single components. Instead PCA was used on 50Hz filtered data to estimate the noise components (as described in the text).