Supplementary Information File 2: Pilot Data

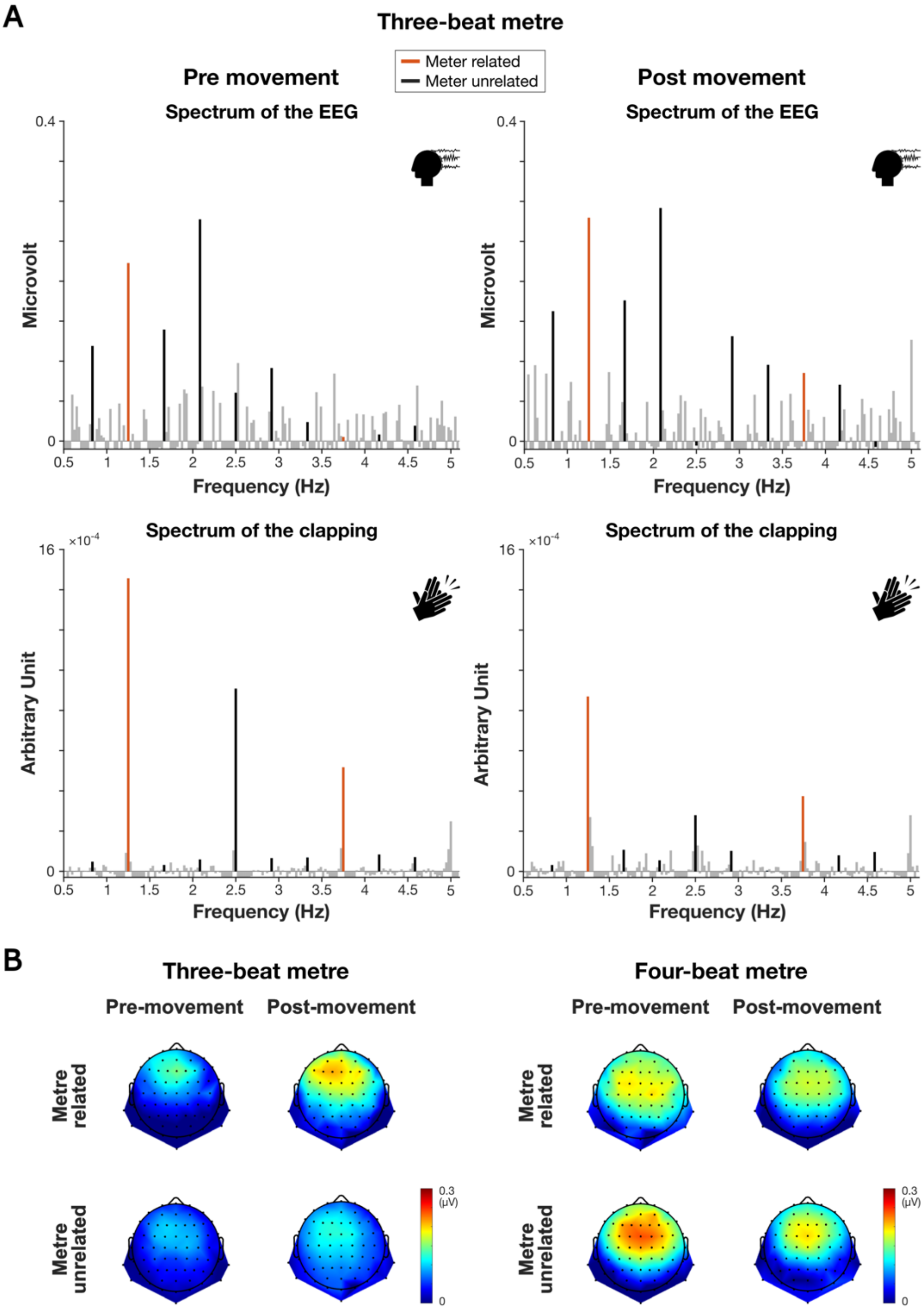
To confirm that the proposed experimental protocol and data collection are logistically feasible and that planned analyses will allow us to test the research hypotheses, we ran a couple of pilot tests (*n* = 1 in the three- and four-beat movement condition). The methods used was the same as described in the Stage 1 manuscript.

The denoised frequency spectra of the collected electroencephalogram (EEG) and hand clapping responses are displayed on Supplementary Figure 1, Panel A. The EEG data showed that the 10 frequencies of interest (i.e., 0.83, 1.25, 1.67, 2.08, 2.50, 2.92, 3.33, 3.75, 4.17, and 4.58 Hz; in red and blue on the figure) protrude when compared to other frequencies (in grey on the figure). This finding is further corroborated by the $z_{\mathrm{SNR,EEG}}$ index, that equals 11.14 and 10.78 for the pre- and post-movement session, respectively (see Figure 2, Panel A). Thus, the EEG responses to the auditory stimulus were prominent when compared to local background noise, which confirm the relevance of our proposed analyses to capture the neural representation of rhythm.

The pilot EEG responses indicated that, in the three-beat metre condition, the relative prominence of metre-related frequencies in contrast with metre-unrelated frequencies was increased after ($\overline{z}_{\mathrm{EEG}}$ = 0.53) when compared to before the movement session ($\overline{z}_{\mathrm{EEG}}$ = 0.18; see Supplementary Figure 1, Panel A). The scalp topographies support this effect by showing that the amplitude at metre-related frequencies was more prominent after vs. before the movement session in the three-beat metre condition, but not in the four-beat metre condition (see Supplementary Figure 1, Panel B). Similar results were found for the clapping responses (pre-movement $\overline{z}_{\mathrm{clapping}}$ = 1.23, post-movement $\overline{z}_{\mathrm{clapping}}$ = 1.49 in the three-beat metre condition; see Supplementary Figure 1, Panel A). Taken together, these first pilot data indicate that both the neural and behavioural entrainment to the metre of a Western-enculturated individual seem enhanced after vs. before the movement session, but only in the three-beat metre condition (i.e., the metre that is more predominant in their cultural background).

Supplementary Figure 1

EEG and Clapping Pilot Data

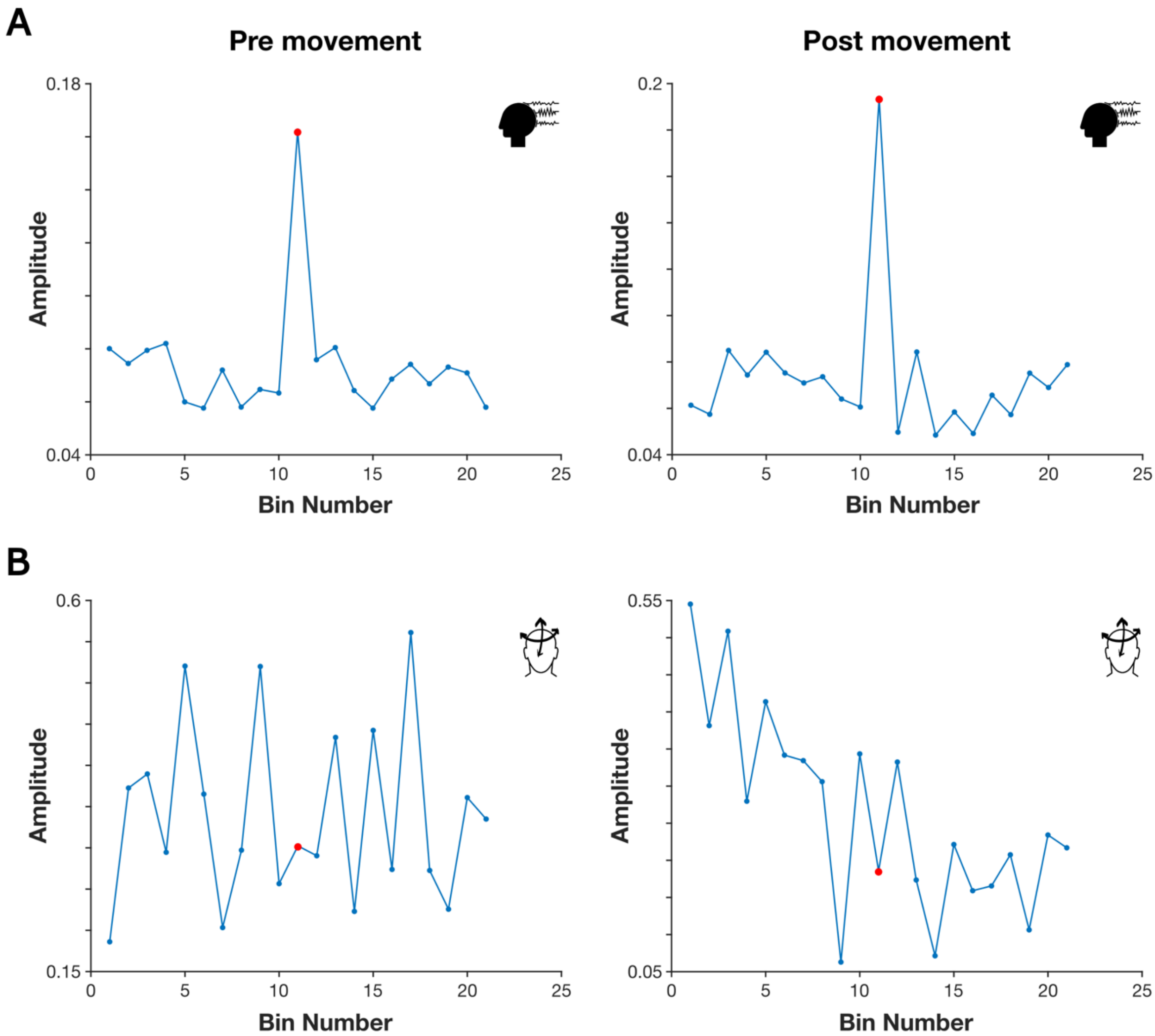


Note. Panel A: Denoised frequency spectrum of the EEG (upper row) and clapping data (lower row) for the pre- (left) and post-movement session (right) for one Western-enculturated participant in the three-beat metre condition. Metre-related frequencies (1.25 and 3.75 Hz) are displayed in red and metre-unrelated frequencies (0.83, 1.67, 2.08, 2.50, 2.92, 3.33, 4.17, and 4.58 Hz) in black. Panel B: Scalp topography of the EEG responses at metre-related (upper row) and -unrelated frequencies (lower row) for the pre- (left) and post-movement session (right). Data from the participant in the three-beat metre condition are displayed on the left and from the four-beat metre condition on the right.

To control for possible confounding effect of head movement during the EEG recording, the signal-to-noise ratio of the head accelerometer was also calculated, but was very low both during the pre- ($z_{\text{SNR,head}}$ = -0.35) and post-movement session ($z_{\text{SNR,head}}$ = -0.63; see Supplementary Figure 2, Panel B). These results confirmed that the observed enhancement of EEG responses at metre-related frequencies are not due to head movement at these frequencies.

Supplementary Figure 2

Control Measures



Note. Data from one Western-enculturated participant in the three-beat metre condition. Panel A: $z_{\text{SNR,EEG}}$ index for the pre- (left) and post-movement session (right). The bin corresponding to the mean of the 10 frequencies of interest is display in red. Panel B: $z_{\text{SNR,head}}$ index for the pre- (left) and post-movement session (right). The bin corresponding to the mean of the two metre-related frequencies is displayed in red.