**Temporal dynamics of motor cortex excitability during perception of natural emotional scenes**

## Supplementary Data

### Supplementary Table 1 - List of IAPS stimuli

Positive pictures: 1601, 2000, 2070, 2080, 2091, 2092, 2165, 2311, 2340, 4002, 4220, 4290, 4572, 4608, 4658, 4659, 4660, 4664, 4800, 4810, 7325, 8032, 8080, 8200, 8280, 8320, 8330, 8370, 8400, 8465, 8490, 8540. Neutral pictures: 2480, 2570, 2840, 2880, 5390, 5500, 5510, 5532, 5731, 5740, 5800, 5900, 7000, 7002, 7004, 7006, 7009, 7025, 7034, 7035, 7040, 7060, 7090, 7100, 7140, 7175, 7190, 7205, 7217, 7233, 7235, 7491. Negative pictures: 2800, 3051, 3102, 3110, 3261, 3530, 3550, 6230, 6242, 6250, 6260, 6313, 6370, 6540, 6570, 6571, 6821, 9040, 9050, 9253, 9300, 9400, 9405, 9410, 9433, 9490, 9520, 9530, 9570, 9810, 9920, 9921.

### Preliminary neurophysiological analyses

Before analyzing motor responses to emotional pictures we first tested whether TMS during the experimental blocks altered motor excitability *per se*, by comparing MEP amplitudes recorded in the first and the last baseline blocks using a Muscle (2 levels: FDI, APB) x Block (2 levels: first, last) repeated measure ANOVA. The analysis yielded no significant main effects or interaction (all $F < 1.63$, $p > 0.22$). Thus, motor excitability of the two muscles was comparable in the baseline and did not change from the first (mean MEP amplitude ± SD: FDI = 1.06 mV ± 0.87; APB = 0.81 mV ± 0.46) to the last block (FDI = 1.09 mV ± 0.84; APB = 0.75 mV ± 0.46), ruling out changes in motor excitability due to the prolonged magnetic stimulations (Cheng et al., 1997).

We then checked whether motor excitability during the emotion evaluation task differed from baseline levels. We compared MEPs collected during the six experimental conditions with those recorded during baseline (average of the two blocks) using a Muscle (2 levels: FDI, APB) x Condition (7 levels: baseline, negative-150, neutral-150, positive-150, negative-300, neutral-300 and positive-300) repeated measure ANOVA. The analysis revealed a significant main effect of Condition ($F_{6,78} = 8.95$, $p < 0.0001$). Dunnett tests showed that MEPs recorded in all the experimental conditions were greater than those recorded in the baseline control condition (all $p < 0.001$). No main effect of or interaction with the factor Muscle resulted significant (all $F < 2.90$, $p > 0.11$). Thus, during the emotion evaluation task there was an increase of motor excitability relative to baseline levels and this increase was similar in the FDI and APB muscles (151% ± 58 and 143% ± 84, respectively; Borgomaneri et al., 2012; Tidoni et al., 2013).

**Relation between classification accuracy and neurophysiological data**

The analysis of the emotion evaluation task accuracy indicates that overall negative pictures were recognized more frequently than positive pictures (~31 and ~28 correct classifications out of 32 pictures, respectively). Thus, one may ask to what extent this difference may explain the greater MEP amplitude for negative relative to positive emotional scenes in the early time window.

We believe MEP changes reflect adaptive motor reactions to negative and positive emotional cues and do not reflect unspecific factors linked to the different recognizability of the two classes of pictures. Contrary to MEP data, the difference between negative and positive pictures in classification accuracy occurred independently of the factor time. Thus, were picture recognizability the key factor affecting motor excitability, we should have found greater response for negative relative to positive also in the late time window. Moreover, it should be noted that classification accuracy was comparable for negative and neutral pictures whereas motor excitability was greater for negative than for neutral pictures in both time windows. Thus, overall classification accuracy and MEPs data exhibited different patterns of results.

We nevertheless carried out a further analysis to provide direct evidence that motor excitability for positive and negative pictures remained the same after balancing classification accuracy. We ordered pictures based on participants' accuracy in the emotion evaluation task (independently of time of presentation, since this factor did not influence accuracy) and started removing positive pictures with the lowest accuracy values and negative pictures with the highest values until a match was reached in the remaining sample. This procedure yielded to a sample of 19 negative and 19 positive pictures with comparable classification accuracy (94.4% ± 10 and 94.3% ± 9, respectively; $t_{13} = 0.04$, $p = 0.97$). The analysis of neurophysiological data associated to this subsample of stimuli confirmed that at 150 ms MEPs were larger for negative (1.28 mV ± 0.65; mean of the two muscles) than for positive pictures (1.15 mV ± 0.54; $p < 0.05$) while they remained similar in the 300 ms condition (1.25 mV ± 0.52 and 1.30 mV ± 0.56; $p = 0.37$). These data speak against the possibility that a different recognizability of the emotional scenes may have played a role in determining the observed pattern of motor excitability.

**Supplementary References:**

Borgomaneri, S., Gazzola, V., & Avenanti, A. (2012) Motor mapping of implied actions during perception of emotional body language. Brain Stimulation, 5, 70-6.

Chen, R., Classen, J., Gerloff ,C., et al. (1997) Depression of motor cortex excitability by low-frequency transcranial magnetic stimulation. Neurology, 48, 1398-1403.

Tidoni, E., Borgomaneri, S., di Pellegrino, G., & Avenanti, A. (2013) Action simulation plays a critical role in deceptive action recognition. Journal of Neuroscience, 33, 611-23.