REVIEWER 1

We thank the reviewer for his/her comments, which have allowed us to improve the manuscript. Please see the point-by-point responses below.

1. Simple Summary: What is the practical use of this corticospinal inhibition?
R1. We now point out that corticospinal inhibition favors a faster and more efficient execution of an action. With this neural finding, we shed light on the critical intermediate phase of motor processing between the observation of an action and the action integration phase aimed at achieving a joint goal.

2. Abstract: Our results provide new insights on the inhibitory and facilitatory drives guiding social motor response generation – what insights?
R2. We now made it clear that the integration of behavioral and neurophysiological indexes allowed us to demonstrate that a more efficient action execution is characterized by greater levels of CSE inhibition. Furthermore, these indexes provide a full picture of motor activity at both planning and execution stages.

3. Keywords: Use mesh terms
R3. Done.

4. Introduction: Is too long
R4. We shortened it, please see changes at pp. 2-3.

5. Aim should be better emphasized
R5. Done. We now specified that “we aimed to carefully decouple action prediction from action integration mechanisms”. Please see changes at p. 2, lines 72-77 and p. 3, lines 104-118.

6. Define naïve volunteers
R6. We explained the term: “participants were naïve to the purposes of the experiment” (see p. 3, lines 127-128).

7. Did you have the Ethical Board approval?
R7. Yes, we did. We had already specified the approval number in the appropriate section, but now we have also listed it in the ‘Participants’ section (see p. 3, lines 125-127).

8. Discussion: The present study confirms and extends previous literature line 501 -which literature?
R8. We have now added the reference within the main text, please see changes at p. 12, lines 520-522.

9. Numerous researches - line 528 which?
R9. Based on the reviewer’s observation we changed the sentence as follows: “Long-standing scientific evidence have shown that motor response is facilitated if the action to be performed has been observed recently: this visuomotor priming effect is defined as the facilitation of performing an action that is congruent with the observed one [65].”

10. What is the difference between the previous study with a similar whole-hand grasping task [68] and the current one?
R10. The previous study by Sartori et al. (2011) aimed at investigating how the placement of individual fingers on objects is affected by the end-goal of the action. Therefore, there is no overlap between the two articles, other than the identification of a general rule for whole-hand grasps that is also relevant in this study. We now clarified it: “In a previous study from our lab [70], we demonstrated that during whole-hand grasps the index finger tends to lift from the surface of the stimulus during demanding conditions” (please see p. 13, lines 567-569).

11. Recent research – which? Line 558
R11. At the end of the sentence we have added the reference to the paper from Di Cesare et al. (2017), please changes at p. 13, lines 579-581.

Di Cesare, G.; De Stefani, E.; Gentilucci, M.; De Marco, D. Vitality Forms Expressed by Others Modulate Our Own Motor Response: A Kinematic Study. *Frontiers in Human Neuroscience* **2017**, *11*, 565, doi:10.3389/fnhum.2017.00565.

12. The discussion should be expanded including similar articles like
Bruno V, Fossataro C, Garbarini F. Inhibition or facilitation? Modulation of corticospinal excitability during motor imagery. Neuropsychologia. 2018 Mar;111:360-368. doi: 10.1016/j.neuropsychologia.2018.02.020. Epub 2018 Feb 17. PMID: 29462639.
Siddique U, Frazer AK, Avela J, Walker S, Ahtiainen JP, Howatson G, Tallent J, Kidgell DJ. Determining the cortical, spinal and muscular adaptations to strength-training in older adults: A systematic review and meta-analysis. Ageing Res Rev. 2022 Oct 9;82:101746. doi: 10.1016/j.arr.2022.101746. Epub ahead of print. PMID: 36223874.
Sun Y, Hurd CL, Barnes MM, Yang JF. Neural Plasticity in Spinal and Corticospinal Pathways Induced by Balance Training in Neurologically Intact Adults: A Systematic Review. Front Hum Neurosci. 2022 Aug 17;16:921490. doi: 10.3389/fnhum.2022.921490. PMID: 36061497; PMCID: PMC9428930.
R12. We included the study by Bruno and colleagues (2018). Thank you for bringing this article to our attention.

13. Also, systematic reviews should be considered in the discussion.
R13. We included a couple of reviews relevant for our topic: a systematic review from Naish et al. (2014) on the effects of action observation on corticospinal excitability, and a recent review from Kemmerer et al. (2021) that addresses the modulatory factors affecting the activation of the motor system during action observation.

Naish, K. R., Houston-Price, C., Bremner, A. J., & Holmes, N. P. (2014). Effects of action observation on corticospinal excitability: Muscle specificity, direction, and timing of the mirror response. *Neuropsychologia*, *64*, 331-348. doi: 10.1016/j.neuropsychologia.2014.09.034

Kemmerer, D. (2021). What modulates the Mirror Neuron System during action observation?: Multiple factors involving the action, the actor, the observer, the relationship between actor and observer, and the context. *Progress in Neurobiology*, *205*, 102128. doi: 10.1016/j.pneurobio.2021.102128

14. Limitations of the study should be shown.

R14. We now discuss the study limitations in the Discussion: “The main limitation of this study is that we attempted to decouple action preparation from action integration and thus could not investigate the interaction between the agents. Future research investigating the inhibitory mechanisms of joint actions should also include the action integration phase aimed at achieving a common goal. As a second limitation, one could argue that the inhibition of corticospinal excitability is due to the mere presence of an outstretched hand approaching the participant, without the effect being intrinsically social. We ruled out this alternative explanation in a previous study, in which a moving arrow replaced the social gesture [83]. The results showed that the arrow resulted in much lower MEP activation than the request gesture ([83], see also [66]).”

15. Conclusion: Should be more specific. First sentence is not a conclusion
R15. Based on the reviewer’s comment, we modified our Conclusions. We changed the first sentence and made the content more specific. Please, see changes at p. 14, lines 633-640.

16. What are the practical tasks?
R16. In the hope of having fully understood the reviewer’s request, we have now tried to better discuss possible applications in a new paragraph, as reported in our response to point 17.

17. What are the clinician’s role and future recommendations for corticospinal inhibition in dyadic motor contexts?
R17. To address the reviewer’s comment on the clinical applications and future recommendations, we inserted a new paragraph in the Discussion dealing with “Future applications”. Here is our additional paragraph (see also changes at lines 619-631):
“The development of a detailed model of behavioral and neurophysiological correlates of action preparation and execution can help identify the subtle social impairments that characterize motor performance, potentially aiding clinicians in the process of establishing a diagnosis. The analysis of the corticospinal excitability index, as a biomarker of motor function, may provide clinicians with new tools to investigate social deficits in the motor domain. Our preliminary results promote the adoption of the corticospinal index as a promising diagnostic tool. In rehabilitation, the use of ecologically valid actions (i.e., resembling everyday activities) can promote the social and motor recovery of various pathologies characterized by impairments in the motor, inhibitory and social domains (e.g., Parkinson’s disease). Indeed, the social nature of the task would make it more motivating for patients compared to tasks performed in isolation, which is crucial for its implications in rehabilitation.”
As concern future recommendations, we also added in the Discussion that “Future research investigating the inhibitory mechanisms of joint actions should also include the action integration phase aimed at achieving a common goal”. Please see lines 612-613.

18. Overall recommendations: the manuscript is too long and a little bit confusing. Try to use shorter sentences and reveal originality and practical utility.
R18. Based on the reviewers’ comments, in the revised version of the manuscript we have made changes to the text that we believe have improved the clarity of the information reported. Furthermore, we better emphasized the originality of our experimental design in the Introduction (see p. 2, lines 72-85).