**Overall Impact:**

The experiments described in this application may yield novel information on the neuroscience of human motor learning and cortical plasticity. The proposed research aims to determine how motor task complexity influences the dynamics of short-intracortical inhibition (SICI) during motor learning, and how these dynamics shape task-related mapping changes in motor cortex (M1). The applicant hypothesizes that increased motor task complexity will result in increased SICI post-training, and that relative task complexity will differentially contribute to motor map reorganization. While the proposed research is exciting and innovative, the current version of the application lacks detailed description of the specific hypotheses to be tested, the analyses used for hypothesis testing, or how precisely the experiments will address the working hypothesis. Without a clearly defined plan for the analysis of experimental results, it is impossible to assess the potential impact of the proposed work.

**Significance:**

* **Strength**: Significant findings related to the dynamics of intracortical inhibition could be extremely valuable in extending basic research on the topic and informing therapies related to movement disorders and rehabilitation.
* **Strength:** If successful, the suite of neuroimaging, neurostimulation, and electric field stimulation techniques proposed would provide motor neuroscience with innovative and impactful tools for studying intracortical inhibition and cortical map reorganization.
* **Weakness**: The application does not expressly state how the working hypotheses will be tested in relation to the proposed experiments. Therefore, it is impossible to evaluate the potential outcomes of the research.

**Investigators:**

* The applicant shows exceptional creativity and good understanding of the equipment, human physiology, and protocols included in the proposal.
* The Action Control Lab has strong prior expertise and protocols to draw from.

**Innovation:**

* **Strength:** The proposedresearch isbased on a strong scientific and technical premise. I believe that once fully realized, the research may produce innovative and impactful findings on the role of intracortical inhibition in motor learning specifically, and cortical plasticity at large.
* **Weakness**: The application does not detail which hypotheses will be tested, and the working hypotheses aren’t clearly framed in terms of NHST in such a way that expected results or outcomes could be extrapolated based on experiment descriptions alone.
* **Weakness**: The application does not describe which statistical methods will be used.

**Approach:**

* **Strength:** Task paradigm and measurement descriptions indicate that the applicant has put substantial thought into the experiments and data they will produce.
* **Weakness:** Task and measurement descriptions are vague at times. Most descriptions are excellent, but occasionally, task descriptions leave important details to the reader’s imagination.
* **Weakness:** While aspects of the measurement protocol are very well-described, the process of measuring SICI via motor-evoked potential is not made crystal-clear and spelled out in such a way that a naïve reader can understand it.

**Environment:**

* The applicant has provided excellent descriptions and practical understanding of the (substantial) equipment requirements of the proposed research.
* The equipment requirements for the proposed research are high, but the applicant demonstrated a detailed knowledge of the procedures and facilities involved.