Reviewer's report

Title: Personalized objects can optimize the diagnosis of EMCS in the assessment of functional object use in the CRS-R: a double blind, randomized clinical trial

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Reviewer: Luigi Trojano

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The authors assessed 21 patients in minimally conscious state (MCS) with the standard version of the Coma Recovery Scale-Revised (CRS-R) and with a modified version in which the Motor Subscale is administered using 'personalized' objects instead of common-use objects (comb, cup). The authors reported that 5/21 patients showed functional use of 'personalized' objects (thus warranting a diagnosis of emergence from MCS) but of common-use objects.

According to the authors such findings confirmed that personal salience of items might exploit responsiveness in some patients with disorders of consciousness.

The paper addresses a very relevant issue for clinicians dealing with patients with disorders of consciousness, i.e. diagnostic challenges, but I believe that it presents several weaknesses that have to be tackled with in a revised manuscript.

1) The authors stated that all patients included in this sample "had the motor ability to move their hands and arms" (P.6). It is not clear how this clinical feature was assessed, which movement could be observed and in which context. This should be made explicit. Moreover, it is common experience that not all MCS patients show movements of the upper limbs, so the authors should clarify whether this was one of the selection criteria.

2) The authors stated (P.7) that CRS-R was administered twice with standard procedures (by examiner A) and twice with personalized objects (by examiner B). However, for diagnostic purposes CRS-R has to be performed more than twice and in different days to reduce diagnostic fallacy in these patients, who often show remarkable fluctuations of their clinical state. Therefore the authors should state explicitly the procedures they used for setting diagnosis.
3) Related to this, it appears that in all patients CRS-R with personalized objects was always administered after standard CRS-R. The authors should state clearly whether this was the case. Order of administration of the two versions should be counterbalanced across subjects.

Another important issue is timing of the examinations reported in the result section. How long time intervened between assessment sessions? Were motor responses consistent across repeated examinations?

4) The authors stated that 'personalized objects' have been chosen by 'family members or nurses' among objects patients used in 'previous daily life'. Apart from typo, it is not clear how the nurses could guess which objects the patients were accustomed to most in premorbid life. It is also important to understand whether objects were selected among actual patients' personal belongings. This is an important point as, after all, a comb and a cup are objects of daily use. In this respect it is also important to acknowledge that, as far as I know, no prescription is present in standard CRS-R instructions, but comb and cup are only suggested as instances.

5) Without having clear all the info specified above, it is not simple to read and understand the value of the results presented in Table 1. Among the five patients showing an improvement of their motor responses with 'personalized' objects, in one MCS+ patient (Case 3) functional use of personalized object might not be very surprising, as s/he showed a quite high CRS-R profile. Instead, some MCS- patients presented very low level motor responses at standard evaluation (abnormal posturing or flexion withdrawal) and yet showed functional object use with personalized objects. It is quite difficult to understand the value of these observations without the info specified above (e.g., in relation to point 1 above: do these patients showed motor abilities in different contexts, and across repeated evaluations? in relation to point 2 above: in which order were the two assessment procedures performed? in relation to point 3 above: how long time did elapse between standard and 'personalized' assessments?). Moreover, some patients showed a parallel improvement on the motor and on the arousal scale during the 'personalized' examination. Could the improvement on motor scale be related to enhanced arousal?

6) The discussion section might be shortened. In its present form it substantially recaps arguments and results presented in the introduction and in the result section.

7) Several typos and English usage mistakes can be found throughout the manuscript. A very careful editing is necessary. Below some instances from the introduction.
P3, Lines 50-53: which presented in a random order. The rest assessments

P5, Line 1: cognitive mediated behavior.

P5, Lines: When the patient shows Functional Object Use (score 6 in the motor function scale) or functional and accurate communication (score 2 in the communication scale) they are diagnosed as the emergence of MCS (EMCS), which is no longer a DOC.

P5, Lines 31-33: response than that of non-self-referential stimuli [5, 6].

P5, Lines 37-39: sound stimuli when patients are applied with PET [7]

Are the methods appropriate and well described?
If not, please specify what is required in your comments to the authors.

No

Does the work include the necessary controls?
If not, please specify which controls are required in your comments to the authors.

No

Are the conclusions drawn adequately supported by the data shown?
If not, please explain in your comments to the authors.

No

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I am able to assess the statistics

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Please indicate the quality of language in the manuscript:

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