Reply to "Is command following unrelated to top-down attention in consciousness disorders?"

Gibson, Raechelle M; Chennu, Srivas; Fernández-Espejo, Davinia; Naci, Lorina; Owen, Adrian M; Cruse, Damian

DOI:
10.1002/ana.24827

License:
None: All rights reserved

Document Version
Peer reviewed version

Citation for published version (Harvard):

Link to publication on Research at Birmingham portal

Publisher Rights Statement:

General rights
Unless a licence is specified above, all rights (including copyright and moral rights) in this document are retained by the authors and/or the copyright holders. The express permission of the copyright holder must be obtained for any use of this material other than for purposes permitted by law.

• Users may freely distribute the URL that is used to identify this publication.
• Users may download and/or print one copy of the publication from the University of Birmingham research portal for the purpose of private study or non-commercial research.
• Users may use extracts from the document in line with the concept of ‘fair dealing’ under the Copyright, Designs and Patents Act 1988 (?)
• Users may not further distribute the material nor use it for the purposes of commercial gain.

Where a licence is displayed above, please note the terms and conditions of the licence govern your use of this document.

When citing, please reference the published version.

Take down policy
While the University of Birmingham exercises care and attention in making items available there are rare occasions when an item has been uploaded in error or has been deemed to be commercially or otherwise sensitive.

If you believe that this is the case for this document, please contact UBIRA@lists.bham.ac.uk providing details and we will remove access to the work immediately and investigate.

Download date: 25. Jun. 2020
Reply to “Is command following unrelated to top-down attention in consciousness disorders?”

We recently reported a correspondence between event-related potential (ERP)-based evidence of bottom-up attention and command following among patients with severe brain injury. The P3a ERP reflects bottom-up attention and is often obtained by comparing responses to non-target deviant and standard stimuli. The P3b ERP reflects top-down attention and is often obtained by comparing responses to target deviant and standard stimuli. In our article, we quantified bottom-up attention by comparing responses to all deviant stimuli – target and non-target – and all standard stimuli. In their letter, Bonfiglio and Carboncini highlight that our ERP definition comprises both P3a and P3b components and postulate that top-down attention may underlie our reported relationship between command following and ERP-based evidence of attention.

Our contrasts delineate a hierarchy of cognitive abilities. We quantified bottom-up attention by comparing all deviant and standard trials. This contrast has more statistical power than the conventional P3a contrast because more deviant trials are available. Furthermore, we quantified top-down attention by directly comparing target and non-target deviant trials. This approach was necessary because a deviant stimulus is only a target in our paradigm if the participant selectively attends to that deviant stimulus when instructed. If the participant does not comply with task instructions, however, the conventional P3b contrast (target versus standard) could return a significant effect driven by attentional orienting to deviant stimulation. This concern is particularly relevant for the patients in our investigation who could not overtly confirm that they understood and followed task instructions.

To examine any differences between the two approaches, we conducted the P3a and P3b comparisons described by Bonfiglio and Carboncini. These comparisons yielded findings consistent with our original report: we detected P3a effects from all healthy volunteers and all patients who demonstrated command following; and we did not detect P3b effects from any of the patients. The conventional P3b contrast yielded a higher hit-rate in our healthy volunteers (100%) than our original approach (67%); this likely owes to the greater depth of processing elicited by targets relative to standards, as compared with targets relative to non-targets. However, as explained above, the conventional P3b contrast does not necessarily isolate top-down attention in our paradigm.

Bonfiglio and Carboncini also propose an explanatory role of cognitive attitudes in command following, which could be quantified using blink-related EEG or fMRI-based activation of particular cortical networks. We cannot directly investigate this proposal because our EEG and fMRI data were not collected simultaneously. However, the evidence linking intrinsic networks to external awareness adds weight to their hypothesis.

Author Contributions

All authors contributed equally to this work.

Potential Conflicts of Interest

Nothing to report.
References


