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Viewpoint

Registered reports in neuropsychology: Insights from the burning houses study

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ABSTRACT

We recently completed our first registered report project within a neuropsychological population (Moore et al., 2025). In this project, we set out to evaluate the replicability of the seminal case study by Marshall & Halligan (1988) on pre-attentive semantic processing in neglect, and replicated this effect under stringent experimental conditions. Our undertaking of this registered report study spanned over five years. In this viewpoint, we aim to share our personal reflections on this project in the hope that our experiences (and setbacks) can prove helpful for future studies aiming to conduct registered reports in neuropsychological populations. More broadly, our experience with this project provides a salient example of the challenges faced by registered report studies which may help account for the low uptake of this format in neuropsychology. Ultimately, we believe that encouraging adherence to fundamental open science practices including openly preregistering plans and open reporting of data/code should be prioritised in neuropsychology and call for targeted discussions surrounding registered report formats specific to neuropsychological studies.

We recently completed our first registered report project within a neuropsychological population (Moore et al., 2025). In this project, we set out to evaluate the replicability of the seminal case study by Marshall and Halligan (1988) on pre-attentive semantic processing in neglect (Fig. 1). The study reports on a patient with left visuospatial neglect, PS, who exhibited blindsight-like unconscious processing within her neglected hemifield. PS was shown pairs of line drawings depicting one intact house and another with red flames emerging from the left side. When asked whether the drawings were identical, PS did not 'consciously' notice the flames and reported that the houses were the same. However, when asked which house she would prefer to live in, PS chose the intact house rather than the house with the flames in 14/17 trials (Marshall & Halligan, 1988). These findings have been interpreted as evidence for unconscious processing of semantic content, and the study is often quoted in introductory psychology lectures and handbooks on attention around the world.

In our study, we replicated the key preference bias effect reported by Marshall and Halligan (1988) under stringent experimental conditions. However, the majority of patients demonstrating the effect of interest had no visuospatial neglect and the occurrence of the preference biases was not related to semantic content (i.e., fire) (Moore et al., 2025). Our undertaking of this registered report study spanned over five

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Fig. 1 – Visualisation of the computerised burning house task used in our study. Participants were shown stimuli, were asked to report if they were identical, then were asked to report which item they would prefer to have.

years. In this viewpoint, we aim to share our personal reflections on this project in the hope that our experiences (and setbacks) can prove helpful for future studies aiming to conduct registered reports in neuropsychological populations. More broadly, our experience with this project provides a salient example of the challenges faced by registered report studies which may help account for the low uptake of this format in neuropsychology (Binney et al., 2025).

We reflect on aspects of our study where adhering to the stringent methodological requirements associated with conducting our registered report, would have resulted in discarding critically important data. We discuss whether registered report criteria, which were designed for definitive hypothesis testing in healthy participants, may require adaptations when applied to clinical populations to encourage the uptake of registered reports in neuropsychological studies.

The registered report format offers key benefits improving bias control and transparency. This format allows authors to present a realistic depiction of the research process, including highlighting cases in which expectations were not met and research plans changed accordingly. This realistic depiction of the research process however presents unique challenges when used in neuropsychological studies.

Neuropsychological populations are inherently messy, with different patients exhibiting a wide range of behavioural patterns. Neuropsychological studies often deal with this variability by either selecting a small, restricted sample of relatively homogenous patients to target a deficit of interest or by including large and diverse cohorts to represent the population of interest. While registered report formats may often encourage the inclusion of clean and targeted samples to maximise experimental control, our case provides an example of the benefits (and challenges) associated with including a less selective neuropsychological sample.

Our study purposively recruited patients relatively early post stroke, where neglect prevalence and severity are much higher (Moore et al., 2021; Overman et al., 2024). This approach was adopted to increase the chance of identifying patients who fail to detect lateralised stimuli differences (Fig. 1). The consequence of this approach is that most patients (both with and without neglect) exhibited multiple cognitive domain impairments, which are common in early stages post stroke, but improve over time (Milosevich et al., 2024). Instead of excluding patients with cognitive comorbidities (such as aphasia, memory impairments, apraxia), our study was designed to be inclusive for patients with multiple cognitive impairments. We also planned comparisons to evaluate the selectivity of the association between apparent preference biases and neglect. To enable this, we included a control group of patients with representative levels of post-stroke cognitive impairment, but no visual neglect. We had expected that the key effect would only be present in patients with neglect, but this was not found to be the case. Ultimately, this inclusive approach allowed us to explore key unexpected effects such as a potential association with executive dysfunction. We believe our experience provides a salient example of the benefits of including patients with cognitive comorbidities in neuropsychological registered reports.

In terms of challenges, representative samples can lead to unexpected results which are difficult to interpret in the (often strict) registered report inferential framework of planned analyses and matched hypotheses. For example, unexpected results may not be accompanied by useful contextualising information in registered report introduction sections. This issue, and corresponding complications, are exemplified by our unexpected result of identifying apparent unconscious preference biases in mainly patients without neglect impairment. Our planned pre-registered analyses were designed for patients with neglect and our Stage 1 content contained insufficient detail about how results in patients without neglect should be treated and interpreted differently than patients with neglect. This issue contributed to our extensive Stage 2 review process, as we were asked to refine our Stage 1 content to more adequately explain how patients without neglect should be handled. Whilst one might therefore conclude that more detailed information about how potential unexpected results would be handled should be added to Stage 1 content, it is impossible to predict all potential unexpected findings.

In sum, whilst experimental design choices in classic registered report formats may be more well-suited to clean, selective samples, it is possible to employ more inclusive

approaches in registered reports. In cases where specific comorbidities may interact with key effects, authors can pre-register analyses to explore this possibility rather than restricting the included sample. Whilst it might be beneficial for authors to provide explicit plans for handling unexpected results, this may not always be possible due to the often-unpredictable nature of unplanned results. We believe a shift towards encouraging inclusive samples with strict confound control in analysis could remove some barriers to taking up registered report approaches for a wider range of neuropsychological projects.

Next, the quality of registered reports relies heavily on reviewer (and editor) engagement. Successful registered report projects are the product of active negotiation between the authors and all members of the review team, and it is important that all contributors be prepared to invest extra time and attention to this process. Stage 1 reviewer feedback is critically important as this input often determines vital aspects of final paradigm designs, analysis plans, and inclusion/exclusion criteria. This increased role requires a high level of attention and engagement from the review team, as well as a collaborative discussion with the project authors and editor.

In the context of neuropsychological registered reports, this means that reviewers should be familiar with the unique challenges of working in neuropsychological populations. In our project, Stage 1 reviewers suggested several changes which substantially improved the quality of our study (e.g., flexible testing timing, inclusion of a no neglect patient group). However, no review process is perfect, and some aspects were missed by both the authors and the review team during Stage 1 review. For example, our Stage 1-approved document failed to specify how data from different trial lateralisation would be handled in patients without neglect. In our case, addressing these issues led to a time-intensive Stage 2 review process. This illustrates the importance of increased responsibility on reviewers and authors at Stage 1 as minor oversights which can be quickly addressed in standard submissions may require extensive author (and reviewer) effort to remedy in Stage 2 review.

Given the extended duration of our project, only 1 of 3 original Stage 1 reviewers were available at Stage 2. Not all Stage 2 reviewers were familiar with the nature of Stage 2 review and requested changes as in a standard review. We note that at this point the editor stepped in and, as per Registered Report format, we were not required to make the Stage 1 content changes requested by new reviewer. However, in our case, Stage 2 was still essentially a new review process, where many changes to approved content were requested to remediate ambiguities and insufficiencies in Stage 1 content. This process required significant effort from both the journal editor and the project authors. Whilst journals prefer to use the same reviewers, this is not always possible, and the lack of transparency of the previous steps makes it difficult for the new reviewers to step into this role.

A system of open and signed reviews might be helpful to both recognise the contribution of reviewers into this collaborative effort, as well as to log all reviewer (and editor) interactions associated with the registered report process. This approach would allow all members of the review team to more efficiently reconstruct previous versions, view implemented changes, and access all documents associated with the project, which would particularly help over a longer time and with any new Stage 2 reviewers. Many journals including Imaging Neuroscience, Journal of Cognition, and Cortex are now taking steps towards improving review transparency (and reviewer recognition) by using platforms such as Peer Community In (PCI). All review processes are collaborative, but the detail and importance of this collaboration is increased in registered reports. Openly acknowledging and logging the contributions would both increase transparency and give due credit to reviewers and editors for what might otherwise feel like a thankless task.

While pilot testing is an excellent way to demonstrate study feasibility, the often-required exclusion of pilot data from registered analyses may reduce the feasibility of registered reports in neuropsychology. Pilot testing is recommended to be conducted prior to In Principle Acceptance (Henderson & Chambers, 2022). Our experience provides an example where discarding these data can lead to the reporting of conflicting results.

During our Stage 1 review, we were asked to collect pilot data from a sample of stroke survivors who completed an identical testing protocol to our main sample. We decided to pilot test in 5 patients without neglect and 5 patients with neglect. One of these pilot participants was the only identified patient who exhibited both neglect and preference biases, replicating the seminal case reported by Marshall and Halligan (1988). However, this data could technically not be included in our registered analyses, as this data was collected prior to in principle acceptance. This created a results section where one of the key findings in our pre-registered analysis (effect not replicated in any patients with neglect) was clearly contradicted by the presented pilot data (where a replication effect was found in a patient with neglect). In addition to this, the requirement to exclude precious patient (pilot) data ended up resulting in the exclusion of approximately 25% of our total number of tested patients, reducing the quantity of data to report on.

Due to the considerable behavioural variability present in inherently heterogeneous patient groups, pilot samples can contain unique findings and therefore cannot be assumed to simply be replaceable in the same way as in studies with healthy, young participants. We would suggest that, in cases where it is necessary to collect a pilot sample, authors should be given an option to retain this data in their pre-registered analyses (assuming that there are no differences between the pilot and accepted experimental protocol). Such a change might potentially improve the practicality and ultimately increase the uptake of registered report formats in neuropsychology.

Next, in terms of analysis choices, the use of strict statistical power thresholds was a major, and (in hindsight) avoidable source of data loss in our registered report project. All pre-registered frequentist analyses are required to meet strict power thresholds (e.g., power >.9). These thresholds are calculated using expected effect sizes, which are generally estimated based on the effect sizes reported in previous studies. We adopted this approach and set our power analysis thresholds based on the effect size reported by Marshall and Halligan (1988) (Cohen's $w = .648$). However, this effect size

was based on a single patient who completed only 17 trials. Given that extreme and unreliable effect sizes are highly probable when trial numbers are low (Lakens & Evers, 2014), there is a high probability that this previously reported value may not represent all patients. Using strict statistical power thresholds resulted in the loss of important data within our pre-registered analyses. For example, 3 patients who exhibited statistically significant preference bias at a comparable magnitude to the originally reported effect were excluded from analysis because they did not meet our pre-registered power requirements. The most extreme example of this data loss is the exclusion of P02 who preferred intact stimuli over burning stimuli in 16/18 trials in which burning and intact stimuli were reported to be identical (the power threshold was set at 31 trials).

Given the uncertain nature of effect size estimation, it is not clearly effective to employ potentially unreliable effect size estimates to set inflexible power inclusion thresholds. This is particularly the case for effect sizes derived from small studies, which are still typical in Neuropsychology, given the difficulties in recruitment and data acquisition in clinical populations. It is also important to acknowledge that registered reports generally require comparatively rigorous experimental protocols, and it is likely that only a restricted subset of real-world neuropsychological populations will be able to tolerate the full duration of these sessions. Future researchers may want to explicitly plan and pre-register methods for retaining partial datasets (given that patients complete a set portion of trials), rather than planning to exclude all patients who cannot complete the full experimental procedure. Whilst statistical power should always be considered when interpreting the reliability of study results, strict adherence to (potentially unreliable) power thresholds risks discarding important datasets and ending up with critical patient data being lost.

Next, we consider the more general, practical limitations of registered reports in neuropsychology. Conducting any research project takes time, and many of the delays we encountered are specific to our situation (e.g., the COVID pandemic). However, conducting a registered report project may require substantially more time than simply pre-registering your plans on platforms such as OSF and researchers should consider the consequences of all possible delays before committing to this research format. In our case, our team began conceptualising this project in early 2019 when MM was a second-year Ph.D. student. We submitted our Stage 1 manuscript in July 2019 and received in principle acceptance in March 2020. Due to COVID, data collection only began in March 2021, 4 months before the lead author completed their Ph.D. and relocated to begin a postdoctoral position in Australia. Data collection slowed dramatically, but continued with other lab members contributing, though these supporting authors each had their own higher-priority projects. We decided to stop data collection in March 2023, after fully reviewing and analysing the data. Whilst we were 37 participants short of the original recruitment target, this target was designed to enable group analyses which were pre-registered but no longer made conceptual sense within the actual recruited sample. These pre-registered analyses were designed to link neglect severity with pre-attentive processing, and we were confident that these analyses could not be conducted in our recruited sample due to the continued absence of patients with both neglect and preference bias after recruiting 21 patients with neglect. We submitted this project for Stage 2 review in October 2024, and it was accepted for publication after a further extensive review process (including both Stage 1 and Stage 2 content) in May 2025.

While not every delay was due to the registered report format itself (e.g., COVID, staff relocations), undergoing Stage 1 review can dramatically increase the time required before data collection can begin (by 9 months in our case) without a definite, clear benefit of expediting Stage 2 review (6 months in our case). Our Stage 2 timeline may be an outlier, but lengthy Stage 1 reviews can be expected to occur regularly. While this initial stage 1 delay may (in other cases) expedite final review, delays in beginning data collection can be seriously detrimental. Whilst time constraints imposed by employment contracts, student deadlines, or funding durations are universal, neuropsychological research requiring specialist access to vulnerable populations is conceivably even more impacted by this. Researchers with the necessary ethics and governance approvals and patient access in place cannot as easily be replaced. Neuropsychology researchers considering a registered report should carefully weigh the risks associated with delaying data collection and may want to consider alternative routes to pre-registration. A recent commentary by the British Neuropsychology Society further provides practical advice on this (Binney et al., 2025).

Finally, it is worth noting that registered reports' rigid reporting format is not conducive to concise and elegant study write-ups. High-quality open science is reliant on rigorous methodology and elegant analysis plans, but efficient, complete, and clear communication of findings is also required to ensure reproducibility. This issue is particularly pertinent to neuropsychological registered reports which may require more complex write-ups to adequately describe variability in behaviour across different patient cases. In our case, the goal of clear and concise reporting clashed with the requirement to maintain the original (5 years old) introduction and methods section. Much of the original methods section (available in supplementary materials) described planned analyses which were ultimately not applicable to the sample we collected. Due to this issue, coupled with the requirement to disregard important evidence from our pilot sample, we had planned to withdraw our registered report submission and had written up our findings as a standard study. However, we were encouraged by the Cortex editorial team to complete the registered report process and write this commentary instead to highlight our views and experience. We hope that our experience can inform future neuropsychology researchers, reviewers and editors about the unique challenges faced by registered reports in neuropsychology.

Overall, our experience with this project provides a salient example of the challenges faced by neuropsychological registered reports. However, this experience also highlights key areas which journals, reviewers, and authors can aim to address to encourage further uptake the registered report format in neuropsychology. It is critically important for all members of the review and authorship teams to be familiar with the challenges of working in neuropsychological populations. A move towards open peer review might be

considered to acknowledge the contributions of the reviewers, improve the transparency of the process and make it easier for new reviewers to understand the process of registered reports stage 1 *vs* stage 2 reviews. Registered report reviewers and authors should also aim to collaborative adapt methods to prevent the loss of precious patient data. Authors should carefully consider any risks associated with delaying data collection (and publication) prior to committing to the registered report format. Ultimately, we believe that encouraging adherence to fundamental open science practices including openly pre-registering plans and open reporting of data/code should be prioritised in neuropsychology and call for targeted discussions surrounding registered report formats specific to neuropsychological studies.

CRediT authorship contribution statement

Margaret Jane Moore: Writing – original draft, Conceptualization. **Nele Demeyere:** Writing – review & editing, Conceptualization.

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Declaration of competing interest

None.

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