Human Movement Science adopts *Registered Reports* for hypothesis-driven research

Human Movement Science (HMS) is dedicated to publishing high-quality studies on human movement, bringing together disciplinary and multidisciplinary psychological, biomechanical and neurophysiological research. It aims to advance theoretical understanding of the control and organization of human movement, as well as changes therein as a function of development, learning and rehabilitation. The aims and scope of HMS are continuously evaluated to account for new developments in the field; indeed, this editorial describes an extension of the scope of HMS, motivated by recently raised concerns about scientific practices.

Science is a systematic endeavor by which we generate knowledge about the world. HMS supports this process by publishing theoretical studies, empirical studies, modeling studies, reviews and commentaries; this editorial concerns empirical studies. In general terms, empirical studies may range from exploratory to hypothesis-driven, which are both essential for knowledge generation. In the current publication process, these two classes of empirical studies are often hard to distinguish. There are several reasons for this. The publication process at present is subject to many pressures, arising at various stages, which severely impact its capacity to contribute to knowledge generation. Research institutes and funding agencies fuel a publish-or-perish culture, pressuring scientists into producing impactful results, published in the highest-impact journals possible. In parallel, publishers and editorial boards strive to achieve the highest possible impact factors for their journals and therefore are keen to publish new, significant findings; null-results and replications are only rarely published. These results-oriented pressures have led a culture promoting, or at least not actively preventing, several questionable scientific practices: hypothesis generation after the results are known ('HARKing'), p-value fishing, reporting only manipulations that work, selective reporting of dependent variables, p-value peeking, optional stopping, or even data fabrication (Ioannidis, 2005; Kerr, 1998; Masicampo & Lalande, 2012; Nosek, Spies, & Motyl, 2012; Sackett, 1979; Simmons, Nelson, & Simonsohn, 2011; Wagenmakers, 2007). In addition, the statistical power of many studies is limited at best (Button et al., 2013). These issues fly in the face of the scientific process, because they undermine its truth-generation capability. Even though many scientists are aware of these limitations, escaping these pressures is hard because scientific careers are intimately tied to results and publications. Moreover, only recently have governing institutes started to provide incentives against the aforementioned questionable practices (see, for example, the recent statement of the World Health Organization (http://www.who.int/ictrp/results/reporting/en/; Goldacre, 2015).

More and more scientists are expressing their concerns about the present state of affairs in science (see references above). A relatively recent proposal emerging from this is the *Registered Report*, a new form of publication in which peer review (and acceptance for publication) depends on the clarity of the hypotheses and the ability of the proposed methods to test the hypotheses. Importantly, acceptance for publication does *not* depend on the actual results obtained; it is provided *prior to* data collection. *Registered Reports* are particularly suitable for hypothesis-driven studies and high-impact replications. They eliminate the need for, and possibility of, engaging in many of the aforementioned questionable research practices, because publication becomes fundamentally decoupled from the study outcome. Following their introduction at the journal *Cortex* (Chambers, 2013), *Registered Reports* have been implemented in a range of journals (https://osf.io/8mpji/wiki/home/). We thoroughly appreciate the potential power of this type of publication and hereby thus announce the introduction of *Registered Reports* in HMS.

By and large, we will follow the publication protocol developed by Chris Chambers for the journal *Cortex* (Chambers, 2013). *Registered Reports* are reviewed in two stages. The initial phase occurs before data collection: authors submit an Introduction and Methods section, together with an analysis of expected statistical power. As for regular publications, the Introduction contains an evaluation of the relevant literature, culminating in one or more hypotheses that will be tested in the study. The Methods section describes the experimental set-up, procedures, and analyses in sufficient detail to allow precise replication; once approved, deviation from these methods is not permissible (unless when flaws in a hypothesis test

are detected and changes are agreed with the editorial team). Importantly, authors are required to use statistical methods that maximize the trustworthiness of the findings (e.g., using a priori power analyses (0.9 or higher required), correction for intermediate peeking at the data (Strube, 2006), or Bayesian statistics).

The initial peer review can result in in-principle acceptance, which virtually guarantees publication. Authors subsequently perform their experiment, conduct the analyses, and write their report. Final acceptance of *Registered Reports* depends on how strictly authors adhere to their own, pre-approved, peer-reviewed methodology and analyses, and whether the conclusions drawn are warranted by the data. Authors may still perform additional, exploratory analyses on their data, as long as these are marked as post hoc analyses. Finally, the raw data must be uploaded, time-stamped, to an online open file sharing system. The full guidelines for publishing *Registered Reports* and the Guidelines for reviewers are available on the HMS website (http://cdn.elsevier.com/promis_misc/Guidelines_Registered_Reports_HMS.pdf). Those interested are also referred to the information available on the Open Science Framework website (https://osf.io/8mpji/wiki/home/), which among others addresses many of the frequently asked questions concerning *Registered Reports*. Given that this is a new publication format, it is possible that unforeseen issues may arise in the early phases of its implementation; it is thus conceivable that details of the Guidelines will change during the initial phase of the implementation. We will do our best to work with authors to streamline the process as much as possible.

Registered Reports are prospected to contain high-impact empirical, hypothesis-driven studies, revered for the trustworthiness of the conclusions drawn. HMS will still consider regular (i.e., non-pre-registered) hypothesis-driven empirical studies; however, the shift in the culture of publication associated with *Registered Reports* will have some relatively minor effects on the regular review process. Authors will be required to announce which analyses are exploratory and which are hypothesis-driven; exploratory studies may not be presented as hypothesis-driven. For example, multi-way ANOVAs are almost by definition exploratory and authors will be encouraged to correct for the multiple comparisons implicit to such analyses (Cramer et al., in press). Indeed, *Registered Reports* are not meant to replace exploratory studies, which play an important role in the scientific process, as long as authors are honest about their intentions.

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