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Libre opinion

Authorship sequence, positive competition, and long-term scientific collaborations

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Les écologues Vincent Resh et Bernhard Statzner ont souhaité soumettre ce texte à la rubrique « Libre opinion », adaptée à leur vision humoristique d'une question importante, celle de l'ordre des auteurs qui signent un article scientifique. Après un état des lieux des différentes méthodes couramment appliquées pour déterminer cet ordre, les deux chercheurs détaillent les diverses techniques peu orthodoxes et très drôles qu'ils ont employées, ce qui, selon eux, leur a permis, grâce au plaisir qu'ils y ont trouvé, d'entretenir de longues et fructueuses collaborations.
De manière plus académique, nous avons très récemment abordé des sujets proches dans la revue : la course à la publication (Tedesco, P.A., 2011. The race to publish in the age of ever-increasing productivity, *NSS*, 19, 432-435) et la question de l'évaluation (de Turckheim, E., Hubert, B., Terrasson, D., 2012. Élisabeth de Turckheim : évaluer la recherche finalisée, *NSS*, 20, 210-221).

La Rédaction

Considerations about the inclusion or exclusion of potential authors in research articles, along with decisions about the sequence of authors, has been long acknowledged as one of the most contentious and widely discussed issues among scientists (e.g. Day, 1979; Wren *et al.*, 2007). In part, such issues result from the rapid expansion of the number of authors of scientific articles, and the widespread use of authorship and authorship sequence in determining hiring decisions and promotions (e.g. Statzner and Resh, 2010 and citations therein; Schäfer *et al.*, 2011; Tedesco, 2011; Tol, 2011).

Arguably, competition resulting from the need for numbers of scientific articles and authorship position often has negative consequences (e.g. see examples in Resh and Yamamoto [1994] for freshwater ecology). We know that lifetime animosities resulted from disagreements over authorship issues. However, in a scientific collaboration extending nearly 40 years we found a variety of ways of using positive competition to foster future involvement in projects and to reduce the negative aspects of competition that often accompany decisions of authorship inclusion and sequence.

When our research efforts and publications began in the early 1970s, the "flip of a coin" to determine author sequence was a commonly used technique. This was possible with two authors but more difficult as increasing numbers of authors signed articles. Often, this coin flip was done in a social setting and the result accepted as either the fortune or misfortune of luck. However, we do know of a very highly cited article where this approach was used to determine authorship sequence, but the process was done over the telephone. In this case, the "flipper of the coin" declared himself as winner, and a lifelong, niggling distrust resulted from this incident with the now second author.

The use of alphabetical sequence has been long discussed as viable, but is less widely used today because of the clear advantage of senior authorship being available to a few compared to most authors. This issue is well illustrated in the science-based novel *Cantor's Dilemma* by the biochemist Carl Djerassi (1989), who described an ambitious young scientist legally changing her name from Yardley to Ardley to benefit from the alphabetical sequence convention.

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There have also been attempts to describe the contributions of each of the authors in a footnote, which is done in some journals. From the experiences reported by colleagues, this technique can engender more bad feelings and often results in general, vague, and essentially non-descriptive listing of contributions.

More recently, other more elaborate techniques for determining authorship sequence have been proposed (e.g. Tscharntke *et al*., 2007; cited >25 times as being used as the basis for authorship sequence). Moreover, a variety of more-quantitative weighted indices have been developed to evaluate the performance of authors in multiple-authored articles (e.g. Assimakis and Adam, 2010; Abbas, 2011). Sociological aspects of authorship sequence have also included considerations of age and professional rank (Costas and Bordons, 2011), and potential manipulation of performance indicators (e.g. Retzer and Jurasinski, 2009). Furthermore, Klingsporn and Hornbostel (2008) raised the ethical issue that "pseudoauthors" who have not contributed significantly to a publication may endanger public trust in the scientific review system. Related to this, many authors have noted the presence of the Matthew Effect (from the biblical verse "For unto every one that hath shall be given, and he shall have abundance: but from him that hath not shall be taken even that which he hath" Matthew 25:29), which emphasizes that more credit will be given to authors of an article who are already well known, regardless of their contributions (Merton, 1968).

In this opinion note, we describe (i) hitherto unpublished techniques that we have used for determining authorship sequence beginning almost 30 years ago, and (ii) the various permutations that these approaches have undergone over time between our own and among other collaborations. We believe that these techniques can provide a level of enjoyment that leads to more productive relationships and, as a by-product, lower-stress careers.

Examples of authorship sequence determination

In 1985, we and a third researcher conducted a large project involving studies of the effects of hydraulic conditions on stream organisms that took place in three different parts of Germany over the course of one month. Fieldwork and stream sampling in each site was rigorous and eating well was essential in carrying out the project. A proposal was made among the three collaborators to see if not only weight could be maintained but actually increased during this process. A precision scale was purchased and weights of all participants were taken: just before the study; typically each evening of the study; and just after the study was completed. Moreover, a control (the wife of one of the participants), who often ate with us but was not involved in the sampling or competition, served to eliminate uncontrolled variables (e.g. if she gained or lost weight, the results may have been caused by extrinsic factors).

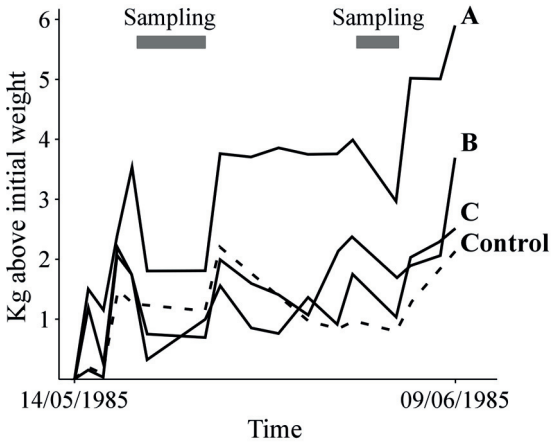

Fig. Weight evolution of three co-authors (A, B, C) and a control (A's wife) over a study that included two periods of intense field sampling.

Results indicated that although the onset of sampling produced an initial weight loss (Fig.), there were large differences among individual weights achieved by the participants. This increase was then the basis of authorship of the two resulting articles (Statzner *et al*., 1988, 1998). However, there was a downside to winning this competition in that the winner became the first author but also had to do the writing of what were very long and complex articles!

Overall, the above competition produced entertaining and enjoyable meals (sometimes a bit difficult on digestion, such as cheese with goose fat in the Harz region). Moreover, the nightly weighing fostered a sense of fun during what easily could have been strenuous and exhausting activities. Expectedly and likely the result of younger ages, all participants returned to original, pre-sampling weights quite rapidly.

Because the above study involved measuring 213 biological samples and >40 physical variables per sample, a follow-up study of the effects of flood releases from dams on the hydraulic habitat of aquatic organisms lead to the development of a single device enabling easier physical measurements (Statzner and Müller, 1989). This shift in fieldwork effort resulted in the need for a different type of competition. There, two of these hydraulic measuring devices, which were hemispheric in shape, used in the project were joined into an asymmetrically weighted cue ball (one half having a density of 1.02 g cm^{-3}, the other half having 10.02 g cm^{-3}). The authorship sequence was then determined in a series of

pool games (Gore *et al*., 1994). Ironically, the first-place author of this paper was actually the second-place finisher because the actual winner had declined to participate in the competition! We have heard of other research groups doing similar "team building exercises" such as the urban pentathlon of the Stream Team, a highly productive research group at Oregon State University, where five games (pool, bowling, darts, etc.) were used in a similar fashion.

As time went on in our collaborations, variations of food and traditional games were also included. To determine the editorship of a special issue of a journal, the initial screening for sequence was done in a blind wine tasting of 10 French wines, which followed an open tasting in which each of these 10 wines, together with 5 other wines from throughout France, were labeled. Scoring was based on the number of the blind-tasted wines being correctly identified. A resulting tie among two of the three editors was settled with a modified version of the French lawn bowling game (*boules* or *pétanque*), which was done over longer playing fields with varying roughness and slope (thus called "X-Country Petanque"). This game resolved the editorship tie (Statzner *et al*., 1994). This latter approach has also been used to determine authorship of other papers (e.g. Statzner and Resh, 2010).

As time went on, this competitive approach was applied to authorship issues in collaborations with other colleagues as well. Sports-based competitions involved modifying the above-described *pétanque* game to be done in fast-flowing running water (which added momentum to the boule movements and required increased knowledge of stream hydraulics) or comparing horserace track winnings to losses during an afternoon at the horse races. A final, recent competition involved guessing the number of stream insects collected in a large number of quantitative field samples (which is akin to guessing the number of beans in a jar).

Conclusions

An old adage related to many academic and research positions is the need to "publish or perish". However, we have seen the climate surrounding authorship disputes deteriorating in recent years so that perhaps, in some collaborations, this mantra should be "publish and perish". Our approach described in this note has certainly never made us feel that either description applied to our collaborations. Of course, this competitive approach should not be used with graduate students or technicians, i.e. when power distributions are not equal. Moreover, as time has gone on, we have opted to decide that the winner of the competition gets to choose who will be the first author, because this position involves far more work and effort in the writing and preparation of the article (and often the electronic-submission process!), and one that becomes increasingly less attractive with age.

As the two of us approach retirement, we feel that the above-described activities have served to enhance the enjoyment offered over nearly 30 years of collaborations during our careers. This note is not intended to demean other, increasingly quantitative methods that have been suggested to decide about the authorship of scientific articles. Perhaps, however, it may be an alternative that others might consider, thereby reviving the enjoyment that scientific cooperation often generated (Cullen *et al*., 1999) before science became so competitive that statistical methods had to be developed to define and evaluate the order of authorship on scientific papers.

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