Academic profiling, instead of ranking, with ProAc

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As academics, we work in an environment in which we are constantly ranked against each other leading to an unnecessarily competitive work environment. We compete for jobs, presentation slots, and scientific output. The resulting research pressure minders research quality by leaving less room for critical aspects like literature research, testing results, and mastering scientific methodologies. At the heart of the current academic ranking is the single-number metric, the *h*-index. The metric even fails to accurately provide the ranking itself. Here, I introduce a radically different approach: Profiling, instead of ranking, academics. An academic profile facilitates assembling effective research teams, and reduces academic bias and unnecessary competition. The key is one single visual profile, ProAc, which can be created by both individual academics and research hosts, combining multiple new and existing metrics. As part of a more conventional qualitative CV, the graphic profile will foster a fairer and more efficient academic evaluation that takes advantage of objective metrics without misinterpreting them.

1 Introduction

Today, an academic career strongly depends on the peer-reviewed publication productivity and its impact. Both are meant to be reflected in one single number: the *h*-index (Hirsch, 2005). This

number supposedly ranks all privileged and non-privileged scientists, in both their early and late career, from normal to outstanding, in worse and better. The number in itself is debatable (e.g., Hirsch, 2020; Yong et al., 2014), especially from an interdisciplinary perspective, as the number of citations significantly differ between individual disciplines without being a result of scientific greatness, but rather of the variation in the overall number of studies being published within the different disciplines (Anauati, Galiani, and Gálvez, 2016; Bornmann and Daniel, 2008). Yet, it is this one-dimensional ranking system that appears to be the sharp blade between being funded and rejected. As a result, it sows unnecessary competition between peers, unhealthy publishing pressure, and thereby increases the number of publications and decreases their quality: One high-quality study is graded less than two of them in low-quality. Moreover, past achievement is presently the key to jobs and funding (e.g., Hirsch, 2020): a huge setback for both young motivated academics and novel ideas. An employer does not necessarily want the most productive person to work in her project, she wants the best-suited one for the project. A funding agency does not necessarily want to fund the most-productive person, they want to fund the person that is best-suited for making the proposed project a success. Science is not a competition between scientists, it is teamwork towards a common goal.

ProAc proposes therefore to apply a novel profiling of academics that is based on not one, but multiple, insightful indices that allow to characterise, rather than just rank, academics. The ProAc profile has been developed using both existing and novel academic indices (e.g., with the *h*-index included as part of it) and made accessible via an effective graphical representation. To circumvent the initial difficulty to gain access to individual academic data, but also to increase evaluation transparency, the ProAc open-access toolbox will allow all academics to create their own profile.

A broad use of the ProAc profile will likely have a significant impact on academia as a whole, as is outlined in the following three hypotheses.

- **Hypothesis 1: Academic profiling will enhance research quality instead of quantity.** Removing the obvious pressure to increase the *h*-index as swiftly as possible will enhance the quality of individual studies (e.g., by allowing for more creative approaches) and reduce the quantity of low-quality studies.
- **Hypothesis 2: Academic profiling will allow to build more effective research teams.** Individual academics should, in the optimal case, complement each other in their skill set to build an effective team for a given project. A team built on the academic profiles of its individual members, rather than on the basis of the *h*-index only (e.g., Batista, Campiteli, and Kinouchi, 2006), is more likely to achieve this goal.
- **Hypothesis 3: Academic profiling will reduce the psychological pressure on academics.** Removing the one-dimensional grading of academics against each other will significantly reduce the mental stress and, with it, misbehaviour of individuals in academia (e.g., Gálvez, 2017; Van Noorden, 2020).

2 Shortcomings of academic ranking

Ranking academics against each other only makes sense on first sight. The current academic ranking system produced an unnecessarily competitive work environment in which careful research (e.g., based on scientifically thorough methodology) is an unpopular drag to the overly busy academics. Importantly though, producing good science is generally the outcome of repeated failure; failure that we need to acknowledge and not hide, and leave plenty of room for. Instead, to compete for jobs, we substitute research quality with quantity to boost our ranking score, which depends mainly on scientific output (i.e., the number of peer-reviewed publications). This publishing pressure (a.k.a. "publish or perish") leaves little to no room for critical aspects like literature research, testing results, and mastering scientific methodologies, thereby fostering unnecessary community-wide methodologic flaws like the *Reproducibility crisis* (Schooler, 2014; Baker, 2016) or the *Visualisation crisis* (e.g., Hawkins, 2015; Crameri, Shephard, and Heron, 2020). At the heart of the harmful current academic ranking system is a single-number metric, the *h*-index; and this metric even fails to accurately provide the ranking itself.

2.1 The *h*-index

The *h*-index (Hirsch index; Hirsch, 2005), is a so-called author-level metric. It attempts to represent two things: one is the academic productivity, the other is the citation impact of the publications produced (Glänzel, 2006). The *h*-index is applied throughout academia also for research groups (e.g., Raan, 2006), facilities (e.g., Kinney, 2007), and countries (e.g., Csajbók et al., 2007), and considered in job offering, proposal funding, and even medal awarding to the degree that an academic career might be impossible without achieving a 'high' *h*-index (e.g., Hirsch, 2020).

The *h*-index, while certainly useful in some respects (e.g., measuring the quantity of scientist's publications), is currently facing fundamental criticism, in parts by its inventor himself (Hirsch, 2020), even for the two sole purposes (i.e., measuring productivity and impact) it aims to fulfil. Some shortcomings are listed below.

- The typical number of citations in different fields is not considered, even though the citation behaviour between fields and sub-disciplines vary significantly (Anauati, Galiani, and Gálvez, 2016; Bornmann and Daniel, 2008).
- The author contribution to one publication is ignored, even though it can vary significantly between a single-authored

contribution and a minimal contribution to a peers work (Sekercioglu, 2008).

- The discriminatory power is reduced due to the index being a natural number only that does not interpolate between h and $h+1$ (Ruane and Tol, 2008), which is particularly problematic for early-career researchers.
- Self-citations are not excluded, which therefore leaves the h-index vulnerable to manipulation (Bartneck and Kokkelmans, 2011; Ferrara and Romero, 2013; Gálvez, 2017).
- Coercive citations (i.e., self-interest citation suggestions of editors, but also reviewers) are not prevented but attracted (Van Noorden, 2020; Wilhite and Fong, 2012).
- The significance of the impact measure compared to simpler measures, like the total number of citations, is questionable (Yong et al., 2014).

2.2 Current h-index alternatives

For these critical reasons and others, a multitude of adjustments to the h-index (e.g., $h(2)$, hg, h_l, $h_{firstauthor}$, h_m, h_{mol}, h_{ms}, h_s, hw, $Contemporaryh$, $Rawh$, $Taperedh$, $Weightedh$) and also alternative metrics (e.g., A, AR, f, g, IQp, $Maxprod$, m, Pi, q^2, R, $Specificimpact$, t, $Wohlin$, Wu) have been proposed and partly applied throughout the research community (e.g., Anderson, Hankin, and Killworth, 2008; Batista, Campiteli, and Kinouchi, 2006; Bornmann et al., 2011; Sidiropoulos, Katsaros, and Manolopoulos, 2007). One widely known example is the $i10$ index (Connor, 2011) providing a measure for the number of publications of an academic that reached ten or more citations. Most of the many proposals (i.e., at least 37 alternatives) have been shown to be highly correlated with the original h-index and are therefore largely redundant (Bornmann et al., 2011, and references therein). Moreover, all suggested alternatives above are single-number metrics. Indeed, until today, all these alternative suggestions are built on the assumption that they need to enable a one-dimensional ranking system, for which assigning individuals to a single number is the easiest way of achieving it. However, there is no need for just providing one single measure only to grade academics against each other. In fact, a one-dimensional grading system might even be a disadvantage (see Section 2.1). Rather than grading them based on one single quantity, ProAc therefore proposes the novel approach to profile academics based on their various important skills and achievements.

3 Potential advantages of academic profiling

Profiling, instead of ranking, academics should encourage collaboration instead of competition, boost quality-science instead of quantity-science, and promote novel ideas by early-career researchers through more effective distribution of research funds. It should allow research to build up on everyone's strength and encourage individual academics to improve their academic weaknesses. The ProAc profile reflects the skills and achievements of academics fairer, more thoroughly, and in a less competitive manner than the presently applied h-index. Such an improvement will likely foster more creative and higher-quality research, while decreasing the unhealthy mental pressure on academics. The ProAc initiative will hopefully spark discussions and possibly even some changes to a more sensible evaluation of academics.

4 The visual academic profile ProAc

The graphic ProAc profile (Figure 1) aims to effectively represent an academic's skills, efforts, and achievements in a universally accessible, directly comparable, and time effective manner.

4.1 Metrics of ProAc

ProAc metrics include some of the most common skills and achievements that are currently considered in academic evaluations. The metrics should, in particular, act as incentives to create or maintain an effective academic environment in which high-quality, collaborative, diverse, open, and accessible research is at its centre.

4.1.1 Research quality

The *Research quality* metric reflects the **annual citations per peer-reviewed publication** (AC_{PRP}) and is derived via the annual mean peer-reviewed publication citations over all academic years ($C_{PRP,ann}$) normalised to the number of peer-reviewed publications (O_{PRP}).

$$C_{PRP,ann} = \frac{C_{PRP}}{\max(1, AA)} \tag{1}$$

$$ProAc^{RQ} = AC_{PRP} = \frac{C_{PRP,ann}}{O_{PRP}} \tag{2}$$

where C_{PRP} is the total number of peer-reviewed publications and AA is the number of academic years excluding year-long career breaks.

- **Abbreviation:** $ProAc^{RQ}$
- **Axis limits:** $0 - 20$ citations
- **Intentionally designed for** cultivating higher research quality and avoiding the incentive for unnecessarily high research quantity.
- **Potential improvements** are limiting it to the last 5 (or so) years to reduce impacting the metric with irrelevant past academic work and to encourage improvement of research quality on the short term. Also, the metric needs to be applied only to years older than one year.

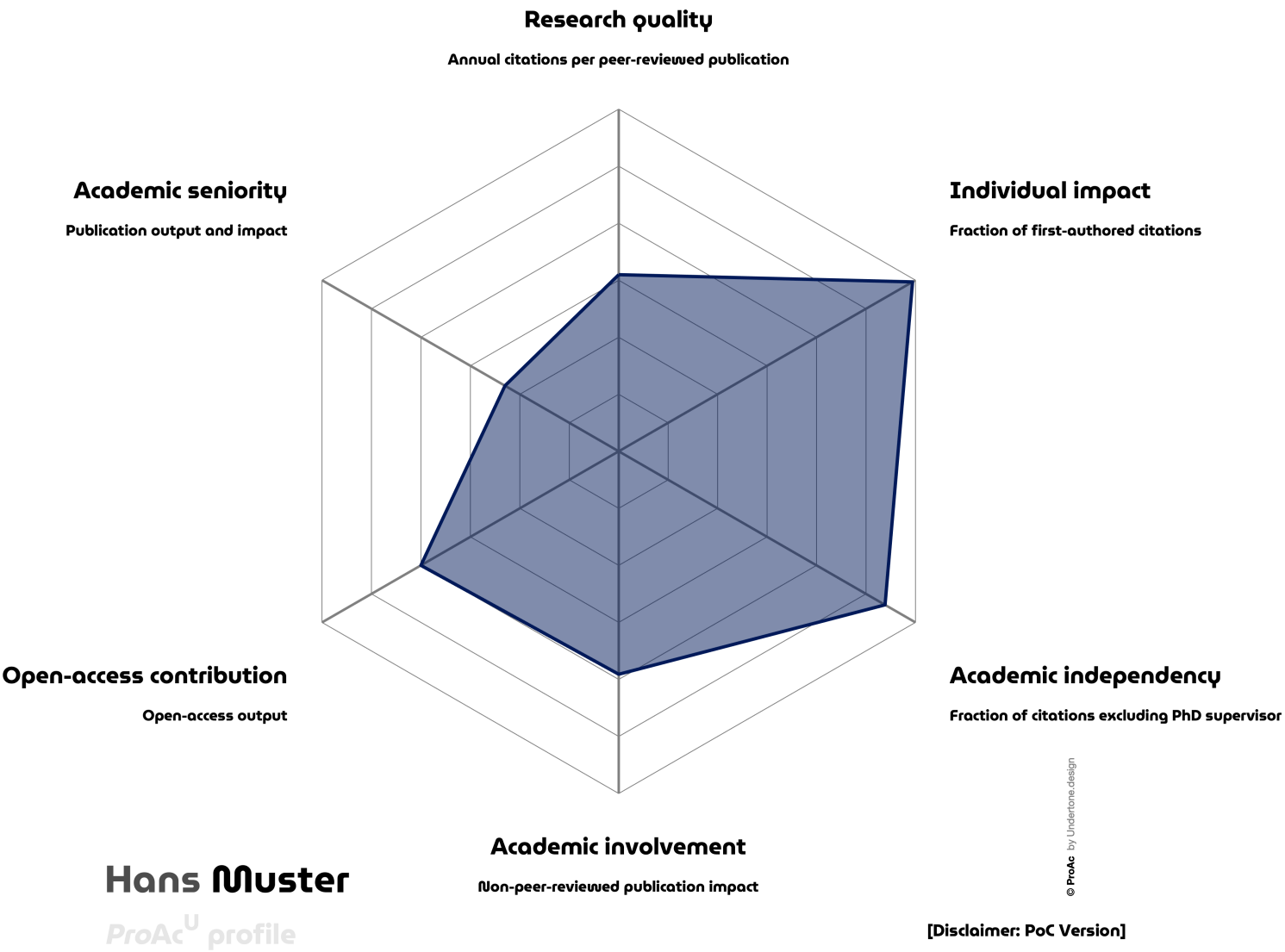

Figure 1: Proof-of-concept ProAc-U graphic design. The graphic ProAc profile will be designed to effectively represent an academic's skills, efforts, and achievements in a universally accessible, directly comparable, and time effective manner.

4.1.2 Individual impact

The *Individual impact* metric reflects the **fraction of first-authored citations** (fC_{FA}) and is derived via the fraction of the total first-authored citations (C_{FA}) relative to the total number of citations (C_{Total}).

$$ProAc^{IM} = fC_{FA} = \frac{1}{C_{Total}} * C_{FA} \tag{3}$$

where all citations include also non-peer reviewed publications (e.g., software, datasets, blog posts).

- **Abbreviation:** $ProAc^{IM}$
- **Axis limits:** $0 - 100\%$
- **Intentionally designed for** acknowledging the effort of a first-authorship and to minder the temptation for unwarranted co-authorship.

4.1.3 Academic independency

The *Academic independency* metric reflects the **fraction of citations excluding the PhD supervisor** (fC_{IND}) and is derived via the total independent (i.e., excluding PhD supervisor) citations (C_{IND}) relative to the total number of citations (C_{Total}).

$$ProAc^{IND} = fC_{IND} = \frac{1}{C_{Total}} * C_{IND} \tag{4}$$

where all citations include also non-peer reviewed publications (e.g., software, datasets, blog posts).

- **Abbreviation:** $ProAc^{IND}$
- **Axis limits:** $0 - 50\%$
- **Intentionally designed for** acknowledging academic independency and to reduce dependency on potent PhD supervisors to kick-off a successful career.

4.1.4 Academic involvement

The *Academic involvement* metric reflects the non-peer-reviewed publication impact in form of the **fraction of non-peer-reviewed publication citations** (fC_{NPRP}) and is derived via the fraction of the total peer-reviewed publication citations (C_{PRP}) relative to the total number of citations (C_{Total}).

$$ProAc^{INV} = fC_{NPRP} = 1 - \frac{1}{C_{Total}} * C_{PRP} \tag{5}$$

where C_{Total} includes also non-peer reviewed publications (e.g., software, datasets, blog posts).

- **Abbreviation:** $ProAc^{INV}$
- **Axis limits:** $0 - 25\%$
- **Intentionally designed for** acknowledging academic involvement beyond publishing peer-reviewed papers and to encourage and improve critical academic duties like public outreach, teaching, toolbox development, editing, and convening.

4.1.5 Open-access contribution

The *Open-access contribution* metric reflects the **fraction of open-access output** (fO_{OA}) and is derived via the open-access (i.e., including non-peer reviewed) output (O_{OA}) relative to the total (i.e., including non-peer reviewed) output (O_{Total}).

$$ProAc^{OA} = fO_{OA} = \frac{1}{O_{Total}} * O_{OA} \tag{6}$$

where all output measures taken here include also non-peer reviewed publications (e.g., software, datasets, blog posts).

- **Abbreviation:** $ProAc^{OA}$
- **Axis limits:** $0 - 100\%$
- **Intentionally designed for** acknowledging open-access research and other academic efforts and to foster a systematic change towards an open academic environment.
- **Potential improvements** Limit to output from last 5 years.

4.1.6 Academic seniority

The *Academic seniority* metric reflects the past achievements in form of the **total publication output and impact** (h-index; see also Section 2.1) and is derived via the total (i.e., including non-peer reviewed) output (O_{Total}). It represents the maximum value of h such that an author has published at least h papers that have each been cited at least h times (Hirsch, 2005). If the function f represents the academic publications ordered in decreasing order from most citations to least citations, then the h-index is calculated as follows:

$$h - index(f) = \max\{i \in \mathbb{N} : f(i) \geq i\} \tag{7}$$

- **Abbreviation:** $ProAc^{h-index}$
- **Axis limits:** $0 - 50$
- **Intentionally designed for** acknowledging output and impact of published academic output.

4.2 Graphic design of ProAc

A common bottleneck to fairly evaluate academics is the little time that is generally available for funders, panellists, or employers to get to know about the relevant details of the applicants. Recent suggestions for improving evaluation objectivity, like a narrative

curriculum vitae (CV), seem therefore ineffective. Graphics are so common in science because they can transfer information accurately and effectively, if done right (Crameri, Shephard, and Straume, 2022). A visual representation of the academic profile seems therefore optimal.

In this, proof-of-concept version of ProAc, the graphic representation is not much more than a place holder and will be carefully developed based on state-of-the-art graphic principles once version 1.0 of the profile has been formed and related visual choices can be made. The resulting graphical representation will fulfil important aspects to ensure a fair academic evaluation.

- **Universally accessible.** All visuals need to be readable for all academics who can see, including those with any type of colour-vision deficiency (CVD; Crameri, Shephard, and Heron, 2020). This will be ensured by using a high contrast graphic elements and CVD-friendly colour palettes (e.g., Crameri, 2018).
- **Directly comparable.** Comparing individual profiles has to be accurate and simple. The key graph has to be standardised (across individual profiles), clear, and simple enough to be rememberable and comparable across individual sheets of papers (e.g., for comparing two CVs next to each other).
- **Time effective.** A sensible visual hierarchy must guide the viewer's eye across relevant graphic elements to ensure transferring key information as quickly as possible.

4.3 Creating and using ProAc

ProAc is intended to not only be used by individual academics, but also created. Creating an individual ProAc profile is supposed to be as simple as possible. The only preset needed is a publication record in tabular form with a predefined design and .CSV format, which can be created with common spreadsheet software. This seems like the most effortless solution especially because it is, amongst academics, already common to keep track of the publication record; creating a publication record in tabular form might often already exist in some form or, else, can be easily put in place. Moreover, having an academic publication record in tabular form is useful in many respects beyond its use for ProAc.

From the .CSV file, the creation of the ProAc profile is effortless: The ProAc toolbox performs extensive diagnostics and creates the application-ready visual profile fully automatically.

4.3.1 ProAc toolbox

The toolbox to create a personal academic profile includes an open-source code to create the graphic profile, and an input table template. The ProAc toolbox will be available on www.fabiocrameri.ch/proac. The proof-of-concept software is currently written in MatLab, and will be made fully open-access in the future for universal usability. The toolbox aims for an effortless use by individual academics. Similarly, the machine-readable input table (Figure 2) is carefully designed to make it as easy and effortless to collect all necessary data. Once created, and regularly updated, it even offers the opportunity to track the individual academic achievements through time. The table simply has to be created in, or later converted to, a .CSV format to be readable by the ProAc software.

4.3.2 Application

The ProAc profile is not intended to replace a listed or narrative curriculum vitae (CV), but aims to complement it with an objective academic characterisation and evaluation. Under all circumstances, it must be kept in mind that the ProAc profile is an incomplete representation of an academic. Important academic skills like teaching, editorial efforts, or social-media outreach are, in the current version, not represented.

The final graphic ProAc profile (Figure 1) will fit on half an A4 page in a standard CV. Moreover, the ProAc profile, and its corresponding graphs, will be suitable to provide an effective overview on individual academics on professional webpages.

4.4 Versioning and future updates of ProAc

ProAc is versioned and its development fully transparent. The software package including its profile metrics and graphic designs will be open for constructive comments by the academic community and future updates will be released via the permanent storage solution provided by Zenodo (zenodo.org) and made conveniently accessible via www.fabiocrameri.ch/proac. This manuscript will be updated accordingly on its pre-print server.

4.5 Potential advantages of ProAc

Besides characterising an academic's research output and impact more accurately (e.g., through measuring first-order individual impact and academic independency), ProAc is intentionally designed to shine light on invaluable academic efforts like public outreach, scientific tool and methodology design, and open-access efforts. If possible, it will make other aspects like teaching, social-media outreach, peer-review and editorial efforts accessible in the future, too. As such, it has multi-faceted advantages and fosters important academic advances.

- **More effective personal academic growth.** A personal profile directly highlights academic shortcomings and achievements and can be used to see potential and track progress.
- **More effective academic teams.** Using ProAc's academic profiles will make it easier to assemble more diverse teams that facilitate teamwork and add significant value to the sum of all individuals. For example, one team member's outreach skills can add value to another one's research outcome, or another one's strong academic independency can help push

Tag	Year	Kind	First authored	Single authored	PhD publication	Including PhD supervisor	Publisher	Open access	Link	Full reference	Current number of citations	Title
Van Zelst et al. (2021)	2021	Pre-print paper	0	0	0	0	EGU Solid Earth	1	https://doi.org/10.5194/se-2021-14	van Zelst, I., F. Crameri, A.E. Pusok, A.C. Glerum, J. Dannberg, C. Thieulot (2021, in review), 101 Geodynamic modelling: How to design, carry out, and interpret numerical studies, Solid Earth Discuss. [preprint], doi:10.5194/se-2021-14	0	101 Geodynamic modelling: How to design, carry out, and interpret numerical studies
Crameri et al. (2020b)	2020	Peer-review paper	1	0	0	0	Nature Communications	1	https://doi.org/10.1038/s41467-020-19160-7	Crameri, F., G.E. Shephard, and P.J. Heron (2020), The misuse of colour in science communication, Nature Communications, 11, 5444. doi:10.1038/s41467-020-19160-7	62	The misuse of colour in science communication
Grima et al. (2020)	2020	Peer-review paper	0	0	0	0	Frontiers	1		Grima, A.G., C.R. Lithgow-Bertelloni, F. Crameri (2020), Orphaning Regimes: The Missing Link Between Flattened and Penetrating Slab Morphologies, Frontiers in Earth Science, 8 (374), doi:10.3389/feart.2020.00374	1	Orphaning Regimes: The Missing Link Between Flattened and Penetrating Slab Morphologies
Crameri et al. (2020a)	2020	Peer-review paper	1	0	0	0	Nature Communications	1		Crameri, F., V. Magni, M. Domeier, G.E. Shephard, K. Chotalia, G. Cooper, C. Eakin, A.G. Grima, D. Gürer, A. Király, E. Mulyukova, K. Peters, B. Robert, and M. Thielmann (2020), A transdisciplinary and community-driven database to unravel subduction zone initiation, Nature Communications, 11, 3750. doi:10.1038/s41467-020-17522-9	18	A transdisciplinary and community-driven database to unravel subduction zone initiation
Uppalapati et al. (2020b)	2020	Peer-review paper	0	0	0	0	JGR	0		Uppalapati, S., T. Rolf, F. Crameri, S.C. Werner (2020), Dynamics of lithospheric overturns and implications for Venus's surface, Journal of Geophysical Research: Planets, 125, e2019JE006258, doi: 10.1029/2019JE006258	1	Dynamics of lithospheric overturns and implications for Venus's surface
Karlsson et al. (2020b)	2020	Peer-review paper	0	0	0	0	JGR	0		Karlsson, R.V.M.K., K.W. Cheng, F. Crameri, T. Rolf, S. Uppalapati, S.C. Werner (2020), Implications of anomalous crustal provinces for Venus' resurfacing history, Journal of Geophysical Research: Planets, 125, e2019JE006340, doi:10.1029/2019JE006340	1	Implications of anomalous crustal provinces for Venus' resurfacing history
Crameri et al. (2019b)	2019	Peer-review paper	1	0	0	0	Elsevier	0		Crameri, F., G.E. Shephard, and C.P. Conrad, (2019), Plate Tectonics?, Reference Module in Earth Systems and Environmental Sciences, Elsevier, doi:10.1016/B978-0-12-409548-9.12393-0	0	Plate Tectonics?
Crameri et al. (2019a)	2019	Peer-review paper	1	0	0	0	Tectonophysics	0		Crameri, F., C.P. Conrad, L. Montési, and C.R. Lithgow-Bertelloni (2019), The dynamic life of an oceanic plate, Tectonophysics, 760, 107-135, doi:10.1016/j.tecto.2018.03.016	21	The dynamic life of an oceanic plate
Crameri (2018)	2018	Peer-review paper	1	1	0	0	GMD	1		Crameri, F. (2018), Geodynamic diagnostics, scientific visualisation and StagLab 3.0, Geosci. Model Dev., 11, 2541-2562, doi:10.5194/gmd-11-2541-2018	105	Geodynamic diagnostics, scientific visualisation and StagLab 3.0
Crameri and Lithgow-Bertelloni (2018)	2018	Peer-review paper	1	0	0	0	Tectonophysics	0		Crameri, F., and C.R. Lithgow-Bertelloni (2018), Abrupt upper-plate tilting during slab–transition-zone collision, Tectonophysics, 746, 199–211, doi:10.1016/j.tecto.2017.09.013	14	Abrupt upper-plate tilting during slab–transition-zone collision
Crameri et al. (2017)	2017	Peer-review paper	1	0	0	1	Gcubed	0		Crameri, F., C.R. Lithgow-Bertelloni, and P. J. Tackley (2017), The dynamical control of subduction parameters on surface topography, Geochem. Geophys. Geosyst., 18(4), 1661–1687, doi:10.1002/2017GC006821	17	The dynamical control of subduction parameters on surface topography
Crameri and Tackley (2016)	2016	Peer-review paper	1	0	0	1	PEPS	1		Crameri, F., and P. J. Tackley (2016), Subduction initiation from a stagnant lid and global overturn: new insights from numerical models with a free surface, Progress in Earth and Planetary Science, 3(1), 1–19, doi:10.1186/s40645-016-0103-8	27	Subduction initiation from a stagnant lid and global overturn: new insights from numerical models with a free surface
Cagney et al. (2016)	2016	Peer-review paper	0	0	0	0	EPSL	0		Cagney, N., F. Crameri, W. Newsome, C.R. Lithgow-Bertelloni, A. Cotel, S. Hart, and J. Whitehead (2016), Constraining the source of mantle plumes, Earth and Planetary Science Letters, 435, 55–63, doi:10.1016/j.epsl.2015.12.008	8	Constraining the source of mantle plumes
Crameri and Tackley (2015)	2015	Peer-review paper	1	0	1	1	JGR	0		Crameri, F., and P.J. Tackley (2015), Parameters controlling dynamically self-consistent plate tectonics and single-sided subduction in global models of mantle convection, J. Geophys. Res. Solid Earth, 120(5), 3680-3706, doi:10.1002/2014JB011664	50	Parameters controlling dynamically self-consistent plate tectonics and single-sided subduction in global models of mantle convection
Crameri and Tackley (2014)	2014	Peer-review paper	1	0	1	1	JGR	0		Crameri, F., and P.J. Tackley (2014), Spontaneous development of arcuate single-sided subduction in global 3-D mantle convection models with a free surface, J. Geophys. Res. Solid Earth, 119(7), 5921-5942, doi:10.1002/2014JB010939	56	Spontaneous development of arcuate single-sided subduction in global 3-D mantle convection models with a free surface
Crameri et al. (2012b)	2012	Peer-review paper	1	0	0	1	GJI	0		Crameri, F., Schmeling, H., Golabek, G.J., Duretz, T., Orendt, R., Buiter, S.J.H., May, D.A., Kaus, B.J.P., Gerya, T.V. and Tackley, P.J. (2012), A comparison of numerical surface topography calculations in geodynamic modelling: an evaluation of the 'sticky air' method, Geophysical Journal International, 189(1), 38-54, doi:10.1111/j.1365-246X.2012.05388.x	240	A comparison of numerical surface topography calculations in geodynamic modelling: an evaluation of the 'sticky air' method
Crameri et al. (2012a)	2012	Peer-review paper	1	0	1	1	GRL	0		Crameri, F., P. J. Tackley, I. Meilick, T. V. Gerya, and B. J. P. Kaus (2012), A free plate surface and weak oceanic crust produce single-sided subduction on Earth, Geophys. Res. Lett., 39(3), L03306, doi:10.1029/2011GL050046	128	A free plate surface and weak oceanic crust produce single-sided subduction on Earth
Crameri and Kaus (2010)	2010	Peer-review paper	1	0	0	0	GRL	0		Crameri, F., and B. J. P. Kaus (2010), Parameters that control lithospheric-scale thermal localization on terrestrial planets, Geophys. Res. Lett., 37(9), L09308, doi:10.1029/2010GL042921	50	Parameters that control lithospheric-scale thermal localization on terrestrial planets
Crameri (2021, ProAc)	2021	White paper	1	1	0	0	Zenodo	1		Crameri, F. (2021). ProAc: Profiling, instead of ranking, academics. Zenodo. doi:10.5281/zenodo.4899015	0	ProAc: Profiling, instead of ranking, academics
Shephard and Crameri (2020, GeoLog)	2020	Blog post	0	0	0	0	EGU	1		Shephard, G.E. and F. Crameri (2020), How many transdisciplinary researchers does it take to find out how an ocean sinks?, edited by H. Gibson, EGU-GeoLog Blog	0	How many transdisciplinary researchers does it take to find out how an ocean sinks?
Crameri (2018, GD blog)	2018	Blog post	1	1	0	0	EGU	1		Crameri, F. (2018), To serve Geoscientists, edited by G.E. Shephard, EGU-Geodynamics Blog	0	To serve Geoscientists
Crameri (2017, Nature Geoscience)	2017	News & Views	1	1	0	0	Nature Geoscience	1		Crameri, F. (2017), Planetary Tectonics: Sinking plates on Venus, Nature Geoscience, 10, 330-331, doi:10.1038/ngeo2941	2	Planetary Tectonics: Sinking plates on Venus
Crameri (2017, GD blog)	2017	Blog post	1	1	0	0	EGU	1		Crameri, F. (2017), The Rainbow Colour Map (repeatedly) considered harmful, edited by G.E. Shephard, EGU-Geodynamics Blog	0	The Rainbow Colour Map (repeatedly) considered harmful
Crameri (2013, PhD thesis)	2013	PhD thesis	1	1	1	1	ETH Zurich	1		Crameri, F. (2013), The interaction between subduction-related mantle currents and surface topography, PhD Thesis, ETH Zurich, doi:10.3929/ethz-a-009954311	7	The interaction between subduction-related mantle currents and surface topography
Crameri (2012, Geoscience Actuel)	2012	Article	1	1	1	0	Geoscience Actuel	1		Crameri, F. (2012), Plattentektonik realitätsnah modellieren, Geosciences Actuel, 2/2012	0	Plattentektonik realitätsnah modellieren
Crameri (2009, MSc thesis)	2009	MSc thesis	1	1	0	0	ETH Zurich	1		Crameri, F. (2009), Parameters that control the formation of lithospheric-scale shear zones, Master Thesis, ETH Zurich	0	Parameters that control the formation of lithospheric-scale shear zones
Crameri (2007, BSc thesis)	2007	BSc thesis	1	1	0	1	ETH Zurich	1		Crameri, F. (2007), Simulation of convection and magmatic resurfacing in Io, Bachelor Thesis, ETH Zurich	0	Simulation of convection and magmatic resurfacing in Io
Crameri (2018, SCM)	2018	Community software	1	1	0	0	Zenodo	1		Crameri, F. (2018), Scientific colour maps: Perceptually uniform and colour-blind friendly, doi: 10.5281/zenodo.1243862, code repository at www.fabiocrameri.ch/colourmaps	125	Scientific colour maps: Perceptually uniform and colour-blind friendly
Crameri (2017, StagLab)	2017	Community software	1	1	0	0	Zenodo	1		Crameri, F. (2017), StagLab: Geodynamic diagnostics and scientific visualisation, doi: 10.5281/zenodo.1199037, code repository at www.fabiocrameri.ch/StagLab	2	StagLab: Geodynamic diagnostics and scientific visualisation
Crameri (2020, SZI Database)	2020	Community database	1	0	0	0	Zenodo	1	http://doi.org/10.5281/zenodo.3756716	Crameri, F., V. Magni, M. Domeier, G.E. Shephard, K. Chotalia, G. Cooper, C. Eakin, A.G. Grima, D. Gürer, A. Király, E. Mulyukova, K. Peters, B. Robert, and M. Thielmann (2020), Subduction zone initiation (SZI) Database (Version 1.0.0) [Data set]. Zenodo. http://doi.org/10.5281/zenodo.3756716	0	Subduction zone initiation (SZI) Database (Version 1.0.0)
Crameri (2020, SZIdatabase.org)	2020	Community website	1	1	0	0		1		www.SZIdatabase.org	0	SZIdatabase.org
Crameri (2017, fabiocrameri.ch)	2017	Community website	1	1	0	0		1		www.fabiocrameri.ch	0	fabiocrameri.ch

Figure 2: Proof-of-concept ProAc input table design. A simple machine-readable table listing the personal academic publication record is used as the only input to create a personal ProAc profile. The effort to create the input is minimal as a publication list has generally already been collected by individual academics (e.g., for personal webpages and/or proposals) and is therefore readily available.

another one's high-quality, but aimless research into a more impactful direction.

- **Fostering high-quality instead of high-quantity publication.** Through widening the academic evaluation criteria beyond research output and impact, ProAc will help to reduce unnecessary publication pressure and destructive competition between peers.
- **More welcoming academic work environment.** Reducing publication pressure and academic competition can lead to more supportive and overall healthier academic teams. The better climate at the workplace will likely reduce unnecessary academic brain-drain.
- **Fairer and more transparent grant and job distribution.** The more objective academic evaluation through a standardised academic profile is more transparent for applicants, who then can better judge their chances of success in advance and whether they want to invest precious research time on grant writing and job applications, or not.

All above points combined have the potential to create a more effective academia as a whole in which individual academics do not shy back from important methodological investments, science outreach, or open-access tool development.

5 Closing

Evaluating academics is not easy, but is currently the standard way to distribute the limited funds. The current academic ranking system, used for the evaluation, is largely based on a single, one-dimensional metric (Section 1) and thereby both incomplete and destructive to individual academics and science as a whole (Section 2.1). Current promises to incorporate a more complete range of academic skills and achievements under consideration of differing work-life balances are hardly translating into the actual evaluation for various reasons: Evaluators are neither objective or the same, nor are they generally trained for the task, and the evaluation time is limited.

A graphic profile is a time-effective way to communicate skills and past achievements, which is why they are commonly used elsewhere to characterise other professionals like athletes or politicians. ProAc is the academic version of graphic profiling. The ProAc profile is not a complete representation of an academic, and never will be. However, if used responsibly, it has the potential to make scientific evaluation more objective and transparent, fairer to applicants, and more time effective and easier to evaluators. One critical necessity is that institutions, funders and employers, make use of the academic profile. A widespread inclusion of the graphic profile into individual academic CVs will help them to take this step forward.

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