EAP in a scientific revolution: English for open and reproducible science

Presentation at BALEAP 2021 conference

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Slides available at https://osf.io/jch2e/

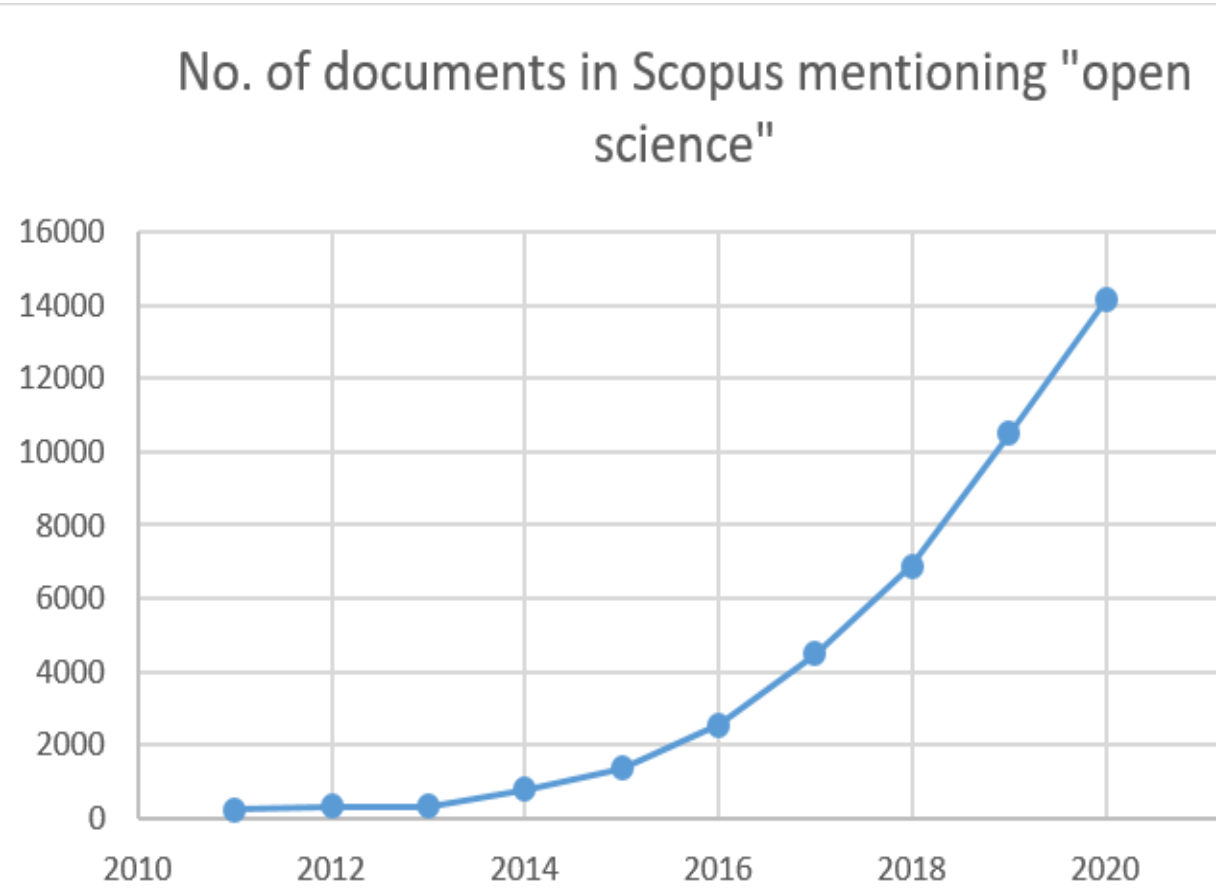
or scan QR code →

Abstract

Key points in bold.
Practical applications covered in this talk in red.

- Science – natural, social, pure, and applied – is undergoing a Kuhnian revolution (Nosek et al., 2018; Christensen et al., 2020). **This "open science" paradigm shift pursues greater transparency and reproducibility**, with changes to data collection, reporting, evaluation, and the rest of the scientific process (Munafo et al., 2017). EAP and science are interdependent – most EAP students worldwide likely to be social or natural science students, and most scientists former or current EAP students. **As science changes, this paper considers how EAP might also change in response.**
- While EAP is traditionally corpus-driven and descriptivist (Ding & Bruce, 2017), **in a time of changing norms, when much literature has been exposed as likely false (Ioannidis, 2005) or involving "questionable research practices", a more prescriptivist EAP is also needed**. These prescriptions should derive from principles valued in the scientific disciplines: classic Baconian and Mertonian norms, or 21st-century updates (e.g. Nosek, 2019).
- This shift, from description of disciplinary pasts, to prescription inspired by disciplinary goals, implies many practical changes for EAP. Disciplinary **"controlled vocabularies"** can be taught, such as engineering's IEEE Thesaurus, and **discourse teaching can move on from IMRAD to more detailed formats** such as APA's Journal Article Reporting Standards or the EQUATOR guidelines. This standardisation of vocabulary and discourse benefits both writing and literature search (Christensen et al., 2019). Newly popular **genres such as Registered Reports should be taught in EAP**, alongside **new scientific writing applications like Sci-Note and Writefull**. **Non-linguistic content** (e.g. heat maps and directed acyclic graphs) increasingly features in scientific communication, and so should feature more in EAP, dual coding known to communicate more effectively than words alone (Clark & Paivio, 1991). Students would learn to **avoid "spin" and overstatement** (Gerritts et al., 2019) and instead prioritise empirical and methodological detail. Promoting transparency, learners would upload their dissertations and related data-sets to **open repositories** like Thesis Commons, and use such repositories for literature search, in addition to commercially-published books and journals. Implementing **ELF norms in teaching and assessment**, we should become more specific about which linguistic features truly influence intelligibility for global scientific audiences, so that EAP practice can catch up with what already happens in much of science (e.g. Rozycki & Johnson, 2013).
- These practices and more are explored, to align with and further ongoing reforms for more open, reproducible science, benefitting both our students and the society they will impact in future.

Open science: Rapid growth



Christensen, G., Wang, Z., Levy Paluck, E., Swanson, N., Birke, D., Miguel, E., & Littman, R. (2020). Open science practices are on the rise: The State of Social Science (3S) Survey. Working Paper Series No. WPS-106. Center for Effective Global Action, University of California, Berkeley. https://osf.io/preprints/metaarxiv/5rksu/

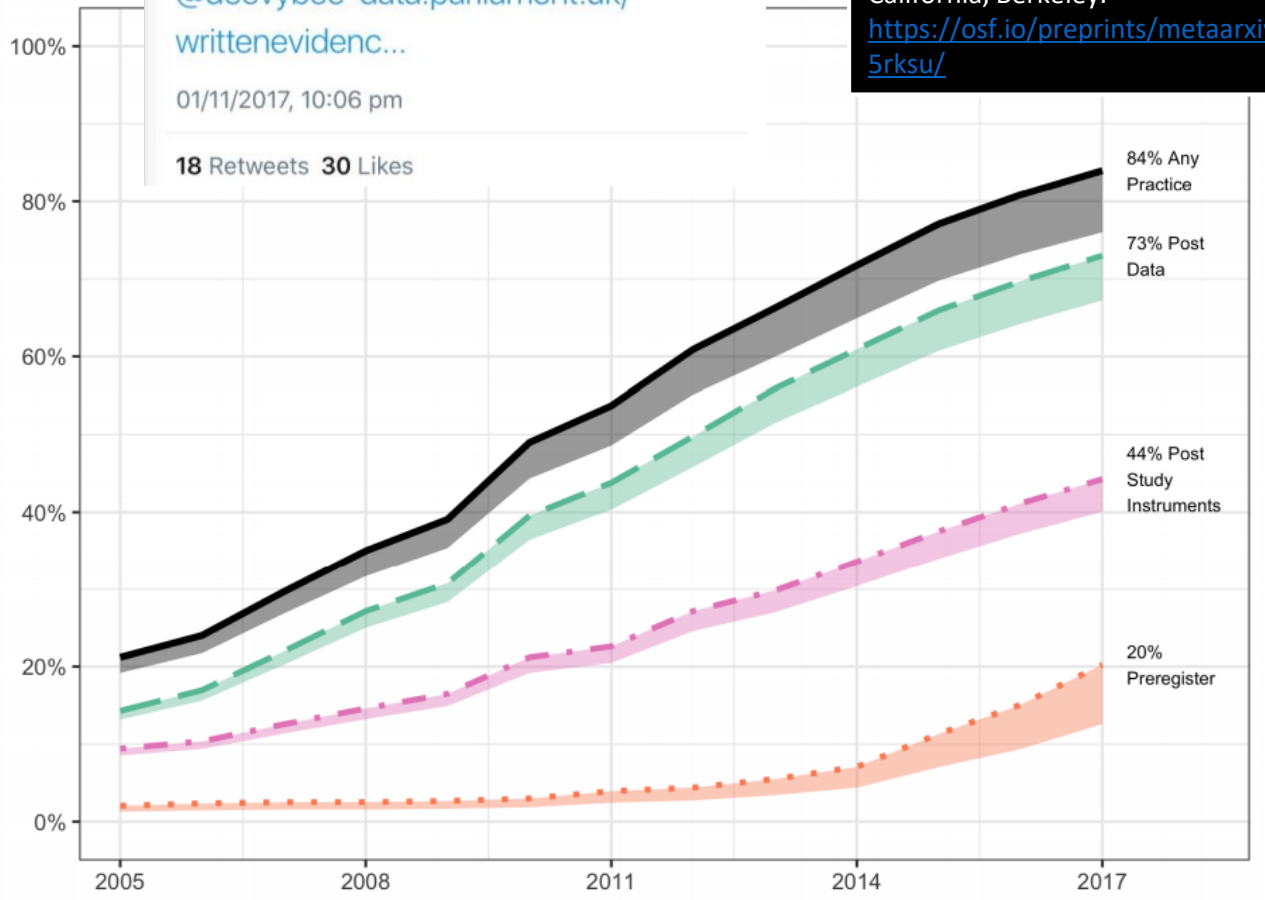


Figure 2: **Year of Adoption of Open Science Practices.** The chart shows for a given year the proportion of Published Authors who had first completed an open science practice in that year or previously. The solid black line shows the proportion of authors who had completed any open science practice by that year. The dashed green line shows the proportion of Published Authors who had posted data or code online by that year. The dash-dotted purple line shows the proportion of Published Authors who had

Open science: What is it?

"improving the **transparency**, **reproducibility** and **efficiency** of scientific research" (Munafo et al., 2017:1)

Munafò, M. R., Nosek, B. A., Bishop, D. V., Button, K. S., Chambers, C. D., Du Sert, N. P., ... & Ioannidis, J. P. (2017). A manifesto for reproducible science. *Nature human behaviour,* 1(1), 1-9. https://doi.org/10.1038/s41562-016-0021

Table 1 | A manifesto for reproducible science.

Theme	Proposal	Examples of initiatives/potential solutions (extent of current adoption)	Stakeholder(s)
Methods	Protecting against cognitive biases	All of the initiatives listed below (* to ****) Blinding (**)	J, F
	Improving methodological training	Rigorous training in statistics and research methods for future researchers (*) Rigorous continuing education in statistics and methods for researchers (*)	I, F
	Independent methodological support	Involvement of methodologists in research (**) Independent oversight (*)	
	Collaboration and team science	Multi-site studies/distributed data collection (*) Team-science consortia (*)	
Reporting and dissemination	Promoting study pre-registration	Registered Reports (*) Open Science Framework (*)	
	Improving the quality of reporting	Use of reporting checklists (**) Protocol checklists (*)	
	Protecting against conflicts of interest	Disclosure of conflicts of interest (***) Exclusion/containment of financial and non-financial conflicts of interest (*)	J
Reproducibility	Encouraging transparency and open science	Open data, materials, software and so on (* to **) Pre-registration (**** for clinical trials, * for other studies)	J, F, R
Evaluation	Diversifying peer review	Preprints (* in biomedical/behavioural sciences, **** in physical sciences) Pre- and post-publication peer review, for example, Publons, PubMed Commons (*)	J
Incentives	Rewarding open and reproducible practices	Badges (*) Registered Reports (*) Transparency and Openness Promotion guidelines (*) Funding replication studies (*) Open science practices in hiring and promotion (*)	J, I, F

Estimated extent of current adoption: *, <5%; **, 5–30%; ***, 30–60%; ****, >60%. Abbreviations for key stakeholders: J, journals/publishers; F, funders; I, institutions; R, regulators.

Practices with closer application to communication/ EAP outlined in red.

Discourse: More detailed reporting standards

APA (2018) https://apastyle.apa.org/jars/qualitative

APA Style JARS
Journal Article Reporting Standards

JARS–**Qual** | Table 1
Information Recommended for Inclusion in Manuscripts That Report Primary Qualitative Research

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- Identify key issues/topic under consideration.

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- State the problem/question/objectives under investigation.
- Indicate the study design, including types of participants or data sources, and analytic strategy, main results/findings, main implications/significance.
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Guidance for Authors

- Consider including at least one keyword that describes the method and one that describes the types of participants or phenomenon under investigation.
- Consider describing your approach to inquiry when it will facilitate the review process and intelligibility of your paper. If your work is not grounded in a specific approach to inquiry or your approach would be too complicated to explain in the allotted word count, however, it would not be advisable to provide explication on this point in the abstract.

Introduction

Description of Research Problem or Question

- Frame the problem or question and its context.
- Review, critique, and synthesize the applicable literature to identify key issues/debates/theoretical frameworks in the relevant literature to clarify barriers, knowledge gaps, or practical needs.

Guidance for Reviewers

- The introduction may include case examples, personal narratives, vignettes, or other illustrative material.

Study Objectives/Aims/Research Goals

- State the purpose(s)/goal(s)/aim(s) of the study.
- State the target audience, if specific.

Study Objectives/Aims/Research Goals (*continued*)

- Provide the rationale for fit of design used to investigate this purpose/goal (e.g., theory building, explanatory, developing understanding, social action, description, highlighting social practices).
- Describe the approach to inquiry, if it illuminates the objectives and research rationale (e.g., descriptive, interpretive, feminist, psychoanalytic, postpositivist, critical, postmodern, constructivist, or pragmatic approaches).

Guidance for Authors

- If relevant to objectives, explain the relation of the current analysis to prior articles/publications.

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- Qualitative studies often legitimately need to be divided into multiple manuscripts because of journal article page limitations, but each manuscript should have a separate focus.
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Research Design Overview

- Summarize the research design, including data-collection strategies, data-analytic strategies, and, if illuminating, approaches to inquiry (e.g., descriptive, interpretive, feminist, psychoanalytic, postpositivist, critical, postmodern, constructivist, or pragmatic approaches).
- Provide the rationale for the design selected.

Guidance for Reviewers

- Method sections can be written in a chronological or narrative format.
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APA (2018) https://apastyle.apa.org/jars/qualitative

Study Participants or Data Sources

Researcher Description

- Describe the researchers' backgrounds in approaching the study, emphasizing their prior understandings of the phenomena under study (e.g., interviewers, analysts, or research team).
- Describe how prior understandings of the phenomena under study were managed and/or influenced the research (e.g., enhancing, limiting, or structuring data collection and analysis).

Guidance for Authors

- Prior understandings relevant to the analysis could include, but are not limited to, descriptions of researchers' demographic/cultural characteristics, credentials, experience with phenomena, training, values, and/or decisions in selecting archives or material to analyze.

Guidance for Reviewers

- Researchers differ in the extensiveness of reflexive self-description in reports. It may not be possible for authors to estimate the depth of description desired by reviewers without guidance.

Participants or Other Data Sources

- Provide the numbers of participants/documents/events analyzed.
- Describe the demographics/cultural information, perspectives of participants, or characteristics of data sources that might influence the data collected.
- Describe existing data sources, if relevant (e.g., newspapers, internet, archive).
- Provide data repository information for openly shared data, if applicable.
- Describe archival searches or process of locating data for analyses, if applicable.

Researcher–Participant Relationship

- Describe the relationships and interactions between researchers and participants relevant to the research process and any impact on the research process (e.g., was there a relationship prior to research, are there any ethical considerations relevant to prior relationships).

Participant Recruitment

Recruitment Process

- Describe the recruitment process (e.g., face-to-face, telephone, mail, email) and any recruitment protocols.
- Describe any incentives or compensation, and provide assurance of relevant ethical processes of data collection and consent process as relevant (may include institutional review board approval, particular adaptations for vulnerable populations, safety monitoring).
- Describe the process by which the number of participants was determined in relation to the study design.
- Provide any changes in numbers through attrition and final number of participants/sources (if relevant, refusal rates or reasons for dropout).
- Describe the rationale for decision to halt data collection (e.g., saturation).
- Convey the study purpose as portrayed to participants, if different from the purpose stated.

Recruitment Process (*continued*)

Guidance for Authors/Reviewers

- The order of the recruitment process and the selection process and their contents may be determined in relation to the authors' methodological approach. Some authors will determine a selection process and then develop a recruitment method based on those criteria. Other authors will develop a recruitment process and then select participants responsively in relation to evolving findings.

Guidance for Reviewers

- There is no agreed-upon minimum number of participants for a qualitative study. Rather, the author should provide a rationale for the number of participants chosen.

Participant Selection

- Describe the participants/data source selection process (e.g., purposive sampling methods, such as maximum variation; convenience sampling methods, such as snowball selection; theoretical sampling; diversity sampling) and inclusion/exclusion criteria.
- Provide the general context for the study (when data were collected, sites of data collection).
- If your participant selection is from an archived data set, describe the recruitment and selection process from that data set as well as any decisions in selecting sets of participants from that data set.

Guidance for Authors

- A statement can clarify how the number of participants fits with practices in the design at hand, recognizing that transferability of findings in qualitative research to other contexts is based in developing deep and contextualized understandings that can be applied by readers rather than quantitative estimates of error and generalizations to populations.

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Data Collection

Data Collection/Identification Procedures

- State the form of data collected (e.g., interviews, questionnaires, media, observation).
- Describe the origins or evolution of the data-collection protocol.
- Describe any alterations of data-collection strategy in response to the evolving findings or the study rationale.
- Describe the data-selection or data-collection process (e.g., were others present when data were collected, number of times data were collected, duration of collection, context).
- Convey the extensiveness of engagement (e.g., depth of engagement, time intensiveness of data collection).
- For interview and written studies, indicate the mean and range of the time duration in the data-collection process (e.g., interviews were held for 75 to 110 min, with an average interview time of 90 min).
- Describe the management or use of reflexivity in the data-collection process, as it illuminates the study.
- Describe questions asked in data collection: content of central questions, form of questions (e.g., open vs. closed).

Vocabulary: Controlled & reduced

findings of a growing number o lars who att the felt and relational, what I call 'affective,' situation of learning in th f te and learners (Britzman 2013, 2015; Walsh 2014; Guthrie 2016; Taubman 20 blayas 2017; Stearns 2018). Investigations of affective aspects of le teaching, as is the one I describe in this paper, are poised to extend how it chers a earchers engage intrasubjective pedagogical processes of educa Casemore 200 ping and Bibby 2014; Garrett

- Concept Mapping
- ~~Conceptual Schemes (1967-1980)~~
- Conceptual Tempo
- Conditioning
- Conservation (Concept)
- Constructivism (Learning)
- Contingency Management
- Convergent Thinking
- Creative Thinking
- Critical Thinking
- Cues
- Decision Making
- Decision Making Skills
- Depth Perception
- Dimensional Preference
- Discovery Learning
- Discovery Processes
- Discrimination Learning
- Epistemology
- Evaluative Thinking
- Executive Function
- Eye Movements
- Memory
- Metacogn
- Misconce
- Mnemoni
- Multisens
- Naming
- Negative Reinforcement
- Nonverbal Learning
- Novelty (Stimulus Dimension)
- Object Permanence
- Observational Learning
- Olfactory Perception
- Operant Conditioning
- Organizational Learning
- Paired Associate Learning
- Patterned Responses
- Perception
- Perceptual Motor Learning
- Pictorial Stimuli
- Planning
- Positive Reinforcement
- ~~Preschool Learning (1966-198~~

Social Emotional Learning

Scope Note: Learning to understand and control one's emotions and build relationships.

Category: Learning and Perception

Search collection using this descriptor

Broader Terms

Learning

Narrower Terms

N/A

Education Resource Information Center (2020) ERIC Thesaurus https://eric.ed.gov

Related Terms

- Emotional Development
- Emotional Intelligence
- Emotional Response
- Interpersonal Competence
- Psychological Patterns

Bergström, A., Stringer, C., Hajdinjak, M. *et al.* Origins of modern human ancestry. *Nature* **590,** 229–237 (2021). https://doi.org/10.1038/s41586-021-03244-5

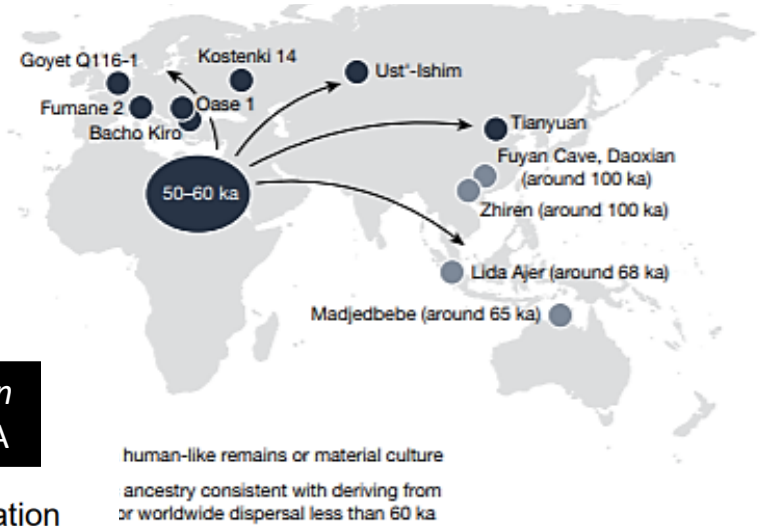
Non-linguistic content

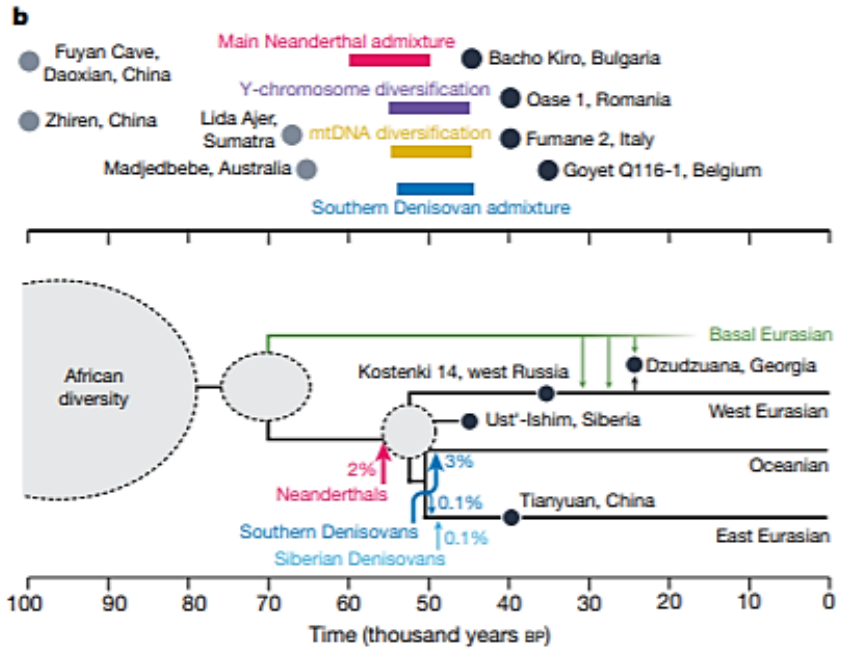
APA (2020) *Publication Manual of the American Psychological Association*, Seventh Edition. APA

Table 2

Master Narrative Voices: Struggle and Success and Emancipation

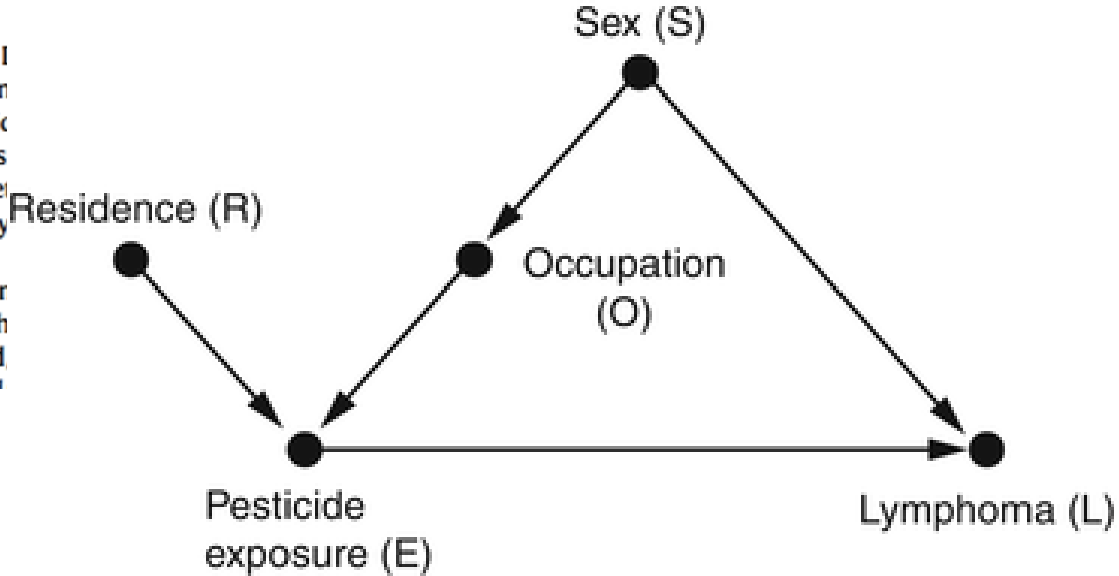
Discourse and dimension	Example quote
Struggle and success	
Self-actualization as a member of a larger gay community is the end goal of healthy sexual identity development, or "coming out"	"My path of gayness . . . going from denial to saying, 'well, this is it,' and then the process of coming out, and the process of just sort of looking around and seeing, well where do I stand in the world? And sort of having, uh, political feelings." (Carl, age 50)
Maintaining healthy sexual identity entails vigilance against internalization of societal discrimination	"When I'm, like, thinking of criticisms of more mainstream gay culture, I try to . . . make sure it's coming from an appropriate place and not, like, a place of self-loathing." (Patrick, age 20)
Emancipation	
Open exploration of an individually fluid sexual self is the goal of healthy sexual identity development	"[For heterosexuals] the man penetrates the woman, whereas with gay people, I feel like there is this potential for really playing around with that model a lot, you know, and just experimenting and exploring." (Orion, age 31)
Questioning discrete, monolithic categories of sexual identity	"LGBTQI, you know, and added on so many letters. It does start to raise the question about what the terms mean and whether . . . any term can adequately be descriptive." (Bill, age 50)





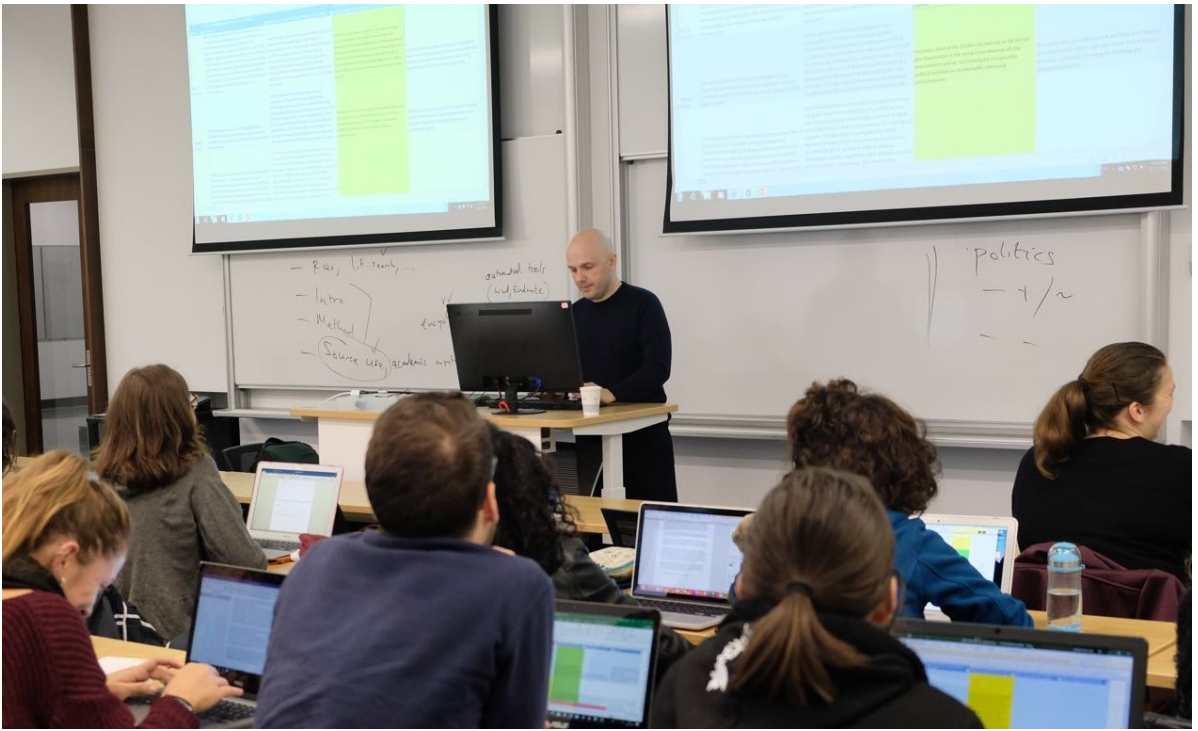
dwide expansion and archaic admixture (phase 3). a, Locations viduals with modern human ancestry in Eurasia, together with sites icate an earlier dispersal in Asia and Sahul (the continental shelf ustralia). **b**, Palaeoanthropological and archaeological evidence of n humans far away from Africa (see older specimens in Greece and the Levant in Fig. 2), and chronology of diversification and admixture events during the worldwide expansion that gave rise to most of the ancestry of present-day people outside of Africa. The genetic ancestry of Bacho Kiro and Fumane 2 has so far only been assessed through mtDNA. Grey circles represent uncertainty around timing or population topology. BP, before present.

uld be confounded by the divergent l ulations, and other studies have four [46–49]. Thus, the fossil and archaeologic utside both Africa and Southwest As ka are best reconciled with the gene not contributing detectable ancestry major expansion.
addition to our understanding of r ica is 'basal Eurasian' ancestry, which n ancestries before these diversified



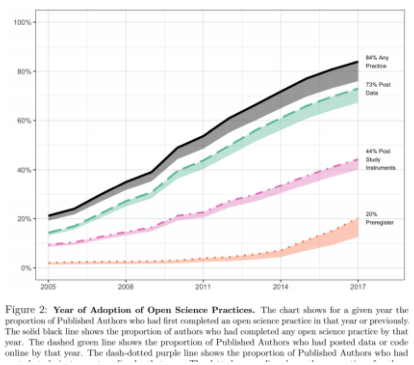
An EAP writing curriculum more influenced by open science

- Academic style
- Nominalization
- Paragraph structure
- Source use



- Citations
- Cohesive devices
- Hedging
- Various other functions (definitions, causal relations, comparisons, …)
- Discourse reporting standards
- Controlled vocabulary
- Creating figures & tables
- Openness of materials & writing
- Technologies for writing

Summary



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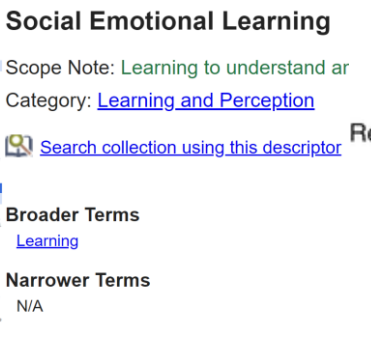
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Scope Note: Learning to understand ar

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Search collection using this descriptor

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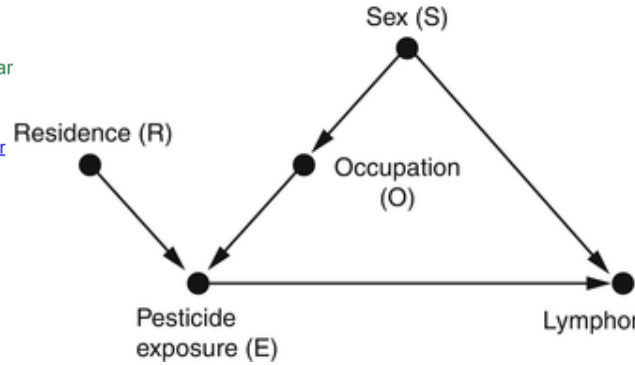

- Science (natural & social) is currently reforming with the goals of increased **transparency, reproducibility, and efficiency**.
- If EAP practitioners want to prepare science students for their target domain, there's an argument that **we should teach them to communicate in a way that better meets these goals**.
- If EAP practitioners share these values, seeing ourselves as working within applied social science, there's an argument that **our professional practices generally should uphold and foster these values** (e.g. sharing our curricula).
- This is a somewhat more **prescriptive** approach, and the prescription comes from those **core scientific values propagated by disciplinary practitioners**.
- (There's also an argument for more work on **non-linguistic content**, such as tables and figures, which might have been neglected in EAP.)
- **Do you agree or disagree with me?** ☺

Thank you for listening! Feedback/questions/etc. ricky.jeffrey@ed.ac.uk rickyjeffrey@gmail.com or Twitter @Ricky_Jeffrey Slides available at https://osf.io/jch2e/