What is an abstract?

An abstract is a self-contained, short, and powerful statement that describes a larger work. As there is no universal formula for writing a successful abstract, components vary according to your discipline. An abstract of a social science or scientific work may contain the scope, purpose, results, and contents of the work. An abstract of a humanities work may contain the thesis, background, and conclusion of the larger work.

Why write an abstract?

You may write an abstract for various reasons. The two most important are selection and indexing. Abstracts allow readers who may be interested in a longer work to quickly decide whether it is worth their time to read it. Also, many online databases use abstracts to index larger works. Therefore, abstracts should contain keywords and phrases that allow for easy searching.

When do people write an abstract?

- When submitting articles to journals
- When applying for research grants
- When writing a book proposal or book chapter
- When completing the Ph.D. dissertation or M.A. thesis
- When writing a proposal for a conference paper

How do I write an abstract? What are the Components?

The format of your abstract will depend on the basic tenets and conventions of your academic discipline. An abstract of a more scientifically oriented research paper will contain elements not found in an abstract of a literature article, and vice versa. However, all abstracts share several mandatory components, and there are also some optional parts that you can decide to include or not. When preparing to draft your abstract, consult some major publication outlets (e.g., journals articles, edited books, reports, etc.) in your discipline to get acquainted with format, style, prose, and other components. As well, keep the following key process elements in mind:

1) **Background and objectives:** What is the importance of the research? What is your work's scientific, theoretical, methodological, or scholarly contribution to your field? Provide some background to your research concisely. What general and specific problem(s) does your work address? What is the scope of the project? Explicitly and clearly state your main objective/argument/thesis/claim.
2) **Methodology and approach:** An abstract of a scientific work may include specific models, approaches, or protocols used. Other abstracts may describe the types of evidence used in the research. Analyzing plays, interviewing human subjects, using animal models in a laboratory setting, collecting data in a field setting, inventing a scientific instrument, translating a book, and reviewing existing body of literature are examples of methods for researchers to conduct research and to produce results.
3) **Results:** Conducting research using procedures described in step 2, what did you learn/accomplish/invent/show? Abstract of a scientific work may include a hypothetical and deductive testing, or specific quantitative or qualitative data that indicate the results of the project. Other abstracts may discuss the findings in a more general, inductive, and/or descriptive way.

4) **Significance and broader implications:** What is unique about your work and how does it add to the body of knowledge on the topic? What are the broader implications of your findings regarding your specific research questions as described in step 1 and 2?

All abstracts include:

- A full citation of the source, preceding the abstract.
- The most important information first.
- The same type and style of language found in the original, including technical language.
- Key words and phrases that quickly identify the content and focus of the work.
- Clear, concise, and powerful language.

Abstracts may include:

- The thesis of the work, usually in the first sentence.
- Background information that places the work in the larger body of literature.
- The same chronological structure as the original work.

Abstracts do not include:

- Extensive references to other works.
- Information not presented in the original work.
- Lengthy definitions and description of concepts or methodological protocols.
- Citations.
- Tables or graphs.

Reverse outlining:

This technique is commonly used when you are having trouble organizing your own writing. The process involves writing down the main idea of each paragraph on a separate piece of paper. For the purposes of writing an abstract, try grouping the main ideas of each section of the paper into a single sentence. Practice grouping ideas using color coding. For a scientific paper, you may have sections titled Purpose, Methods, Results, and Discussion. Each one of these sections will be longer than one paragraph, but each is grouped around a central idea. Use reverse outlining to discover the central idea in each section and then distill these ideas into one statement.

Identify key terms:

Search through the entire document for key terms that identify the purpose, scope, and methods of the work. Pay close attention to the Introduction (or Purpose) and the Conclusion (or Discussion). These sections should contain all the main ideas and key terms in the paper. When writing the abstract, be sure to incorporate the key terms. Instead of cutting and pasting the actual words, try highlighting sentences or phrases that appear to be central to the work. Then, in a separate document, rewrite the sentences and phrases in your own words.

Revise, revise, revise!

No matter what type of abstract you are writing, or whether you are abstracting your own work or someone else's, the most important step in writing an abstract is to revise early and often. When revising, delete all extraneous words and incorporate meaningful and powerful words. The idea is to be as clear and complete as possible in the shortest possible amount of space. The Word Count feature of Microsoft Word can help you keep track of how long your abstract is and help you hit your target length.

Color codes used in the abstract examples below

Background and objectives, Methods and approach, Results, Conclusions and broader implications

Example 1: Medicine

Patients with Covid-19 and obesity have worse clinical outcomes which may be driven by increased inflammation. This study aimed to characterize the association between clinical outcomes in patients with obesity and inflammatory markers. We analyzed data for patients aged ≥18 years admitted with a positive SARS-CoV-2 PCR test. We used multivariate logistic regression to determine the association between BMI and intensive care unit (ICU) transfer and all-cause mortality. Inflammatory markers (C-reactive protein [CRP], lactate dehydrogenase [LDH], ferritin, and D-dimer) were compared between patients with and without obesity (body mass index [BMI] ≥30 kg/m2). Of 791 patients with Covid-19, 361 (45.6%) had obesity. In multivariate analyses, BMI ≥35 was associated with a higher odds of ICU transfer (adjusted odds ratio [aOR] 2.388 (95% confidence interval [CI]: 1.074–5.310) and hospital mortality (aOR = 4.3, 95% CI: 1.69–10.82). Compared to those with BMI<30, patients with obesity had lower ferritin (444 vs 637 ng/mL; p<0.001) and lower D-dimer (293 vs 350 mcg/mL; p = 0.009), non-significant differences in CRP (72.8 vs 84.1 mg/L, p = 0.099), and higher LDH (375 vs 340, p = 0.009) on the first hospital day. Patients with obesity were more likely to have poor outcomes even without increased inflammation.

Example 2: Paleontology

The Toarcian Oceanic Anoxic Event (TOAE; Early Jurassic, ca. 182 Ma ago) represents one of the major environmental disturbances of the Mesozoic and is associated with global warming, widespread anoxia, and a severe perturbation of the global carbon cycle. Warming-related dysoxia-anoxia has long been considered the main cause of elevated marine extinction rates, although extinctions have been recorded also in environments without evidence for deoxygenation. We addressed the role of warming and disturbance of the carbon cycle in an oxygenated habitat in the Iberian Basin, Spain, by correlating high resolution quantitative faunal occurrences of early Toarcian benthic marine invertebrates with geochemical proxy data (δ 18O and δ 13C). We find that temperature, as derived from the δ 18O record of shells, is significantly correlated with taxonomic and functional diversity and ecological composition, whereas we find no evidence to link carbon cycle variations to the faunal patterns. The local faunal assemblages before and after the TOAE are taxonomically and ecologically distinct. Most ecological change occurred at the onset of the TOAE, synchronous with an increase in water temperatures, and involved declines in multiple diversity metrics, abundance, and biomass. The TOAE interval experienced a complete turnover of brachiopods and a predominance of opportunistic species, which underscores the generality of this pattern recorded elsewhere in the western Tethys Ocean. Ecological instability during the TOAE is indicated by distinct fluctuations in diversity and in the relative abundance of individual modes of life. Local recovery to ecologically stable and diverse post-TOAE faunal assemblages occurred rapidly at the end of the TOAE, synchronous with decreasing water temperatures. Because oxygen-depleted conditions prevailed in many other regions during the TOAE, this study demonstrates that multiple mechanisms can be operating simultaneously with different relative contributions in different parts of the ocean.

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Example 3: Linguistics

The origins of linguistic diversity remain controversial. Studies disagree on whether group features such as population size or social structure accelerate or decelerate linguistic differentiation. While some analyses of between-group factors highlight the role of geographical isolation and reduced linguistic exchange in differentiation, others suggest that linguistic divergence is driven primarily by warfare among neighbouring groups and the use of language as marker of group identity. Here we provide the first integrated test of the effects of five historical sociodemographic and geographic variables on three measures of linguistic diversification among 50 Austronesian languages: rates of word gain, loss and overall lexical turnover. We control for their shared evolutionary histories through a time-calibrated phylogenetic sister-pairs approach. Results show that languages spoken in larger communities create new words at a faster pace. Within-group conflict promotes linguistic differentiation by increasing word loss, while warfare hinders linguistic differentiation by decreasing both rates of word gain and loss. Finally, we show that geographical isolation is a strong driver of lexical evolution mainly due to a considerable drift-driven acceleration in rates of word loss. We conclude that the motor of extreme linguistic diversity in Austronesia may have been the dispersal of populations across relatively isolated islands, favouring strong cultural ties amongst societies instead of warfare and cultural group marking.

Example 4: Chemical Biology

It is well-documented that the representation of women and racial/ethnic minorities diminishes at higher levels of academia, particularly in science, technology, engineering, and math (STEM). Sense of belonging—the extent to which an individual believes they are accepted, valued, and included in a community—is often emphasized as an important predictor of retention throughout academia. While literature addressing undergraduate sense of belonging is abundant, there has been little investigation of sense of belonging in graduate communities. Because graduate training is required to generate new scientific leaders, it is important to understand and address sense of belonging at the graduate level—paying explicit attention to devising strategies that can be used to increase representation at higher levels of academia. Here, a visual narrative survey and item response modeling are used to quantify sense of belonging among graduate students, postdoctoral researchers, and faculty within the Department of Chemistry at the University of California, Berkeley. Results suggest that graduate students, postdoctoral researchers, and faculty all experience impostor phenomenon. Respondents struggle most with maintaining positive self-perceptions of their productivity, capabilities as a scientist, and success—particularly in comparison to their peers. Communicating about science with peers, talking about teaching hurdles, and engaging in mentoring relationships also contribute significantly to sense of belonging. Faculty members have the highest sense of belonging, while senior graduate students and postdoctoral researchers are least likely to feel a sense of belonging. Additionally, graduate students and postdoctoral researchers who identify as underrepresented, as well as those who submit manuscripts for publication less than their peers, are less likely to feel a sense of belonging. This is the first study to generate a quantitative, nuanced understanding of sense of belonging within the entire graduate academic community of an R1 STEM department. We envision that these methods can be implemented within any research-focused academic unit to better understand the challenges facing community members and identify factors to address in promoting positive culture change. Furthermore, these methods and results should provide a foundation for devising interventions that academic stakeholders can use to directly improve graduate education.

Color codes used in the abstract examples below

Background and objectives, Methods and approach, Results, Conclusions and broader implications

Example 5: Astronomy

The search for a habitable extrasolar planet has long interested scientists, but only recently have the tools become available to search for such planets. In the past decades, the number of known extrasolar planets has ballooned into the hundreds, and with it, the expectation that the discovery of the first Earth-like extrasolar planet is not far off. Here, we develop a novel metric of habitability for discovered planets and use this to arrive at a prediction for when the first habitable planet will be discovered. Using a bootstrap analysis of currently discovered exoplanets, we predict the discovery of the first Earth-like planet to be announced in the first half of 2011, with the likeliest date being early May 2011. Our predictions, using only the properties of previously discovered exoplanets, accord well with external estimates for the discovery of the first potentially habitable extrasolar planet and highlight the the usefulness of predictive scientometric techniques to understand the pace of scientific discovery in many fields.

Example 6: Economics

This paper contributes to better understand the dynamic interactions between effective exchange rate (EER) and oil price for an oil-importing country like the U.S. by considering a Time-Varying Parameter VAR model with the use of monthly data from 1974:01 to 2019:07. Our findings show a depreciation after an oil price shock in the short-run for any period of time, although the pattern of long-run responses of U.S. EER is diverse across time periods, with an appreciation being observed before the mid-2000s and after the mid-2010s, and a depreciation between both periods. This diversity of response should lead policy makers to react differently in order to counteract such shocks. Furthermore, the reaction of oil price to an appreciation of U.S. EER is negative and different over time, which may generate different adverse effects on investment. The knowledge of such effects may help financial investors to diversify their investments in order to optimize the risk-return profile of their portfolios.

Example 7: Psychology

This study aimed to investigate the anxiety levels of healthcare workers and to provide guidance on potential accurate social and psychological interventions for healthcare workers during the epidemic of COVID-19 in Zhejiang Province, China. Healthcare workers from five hospitals in Zhejiang Province were randomly selected into this study. Zung Self-Assessment Scale for Anxiety (SAS) was used to evaluate the anxiety status of the included 1637 healthcare workers. The total anxiety score of healthcare workers in Zhejiang Province was 30.85 ± 6.89. The univariate analysis showed that the anxiety level of healthcare workers was related to gender, education, occupation, physical condition, job risk coefficient, and with family members on the first-line combating COVID-19 ($P < 0.05$). The multivariate analysis showed that physical condition and job risk coefficient were predictors of anxiety levels of healthcare workers. During the epidemic of COVID-19, 1637 healthcare workers generally had an increased tendency to have anxiety. Individualized assessment of the anxiety level of healthcare workers should be provided, and different interventions should be given based on the evaluation results.

Color codes used in the abstract examples below

Background and objectives, Methods and approach, Results, Conclusions and broader implications

Example 8: Civil Engineering

In this paper, a novel 3D roaming algorithm considering collision detection and interaction is proposed that adopts a triangle mesh to organize and manage massive spatial data and uses a customized bounding box intersector to rapidly obtain the potential collided triangles. The proposed algorithm can satisfy the requirements of timeliness and practicability during complicated large 3D scene collision detection. Moreover, we designed a method to calculate the collision point coordinates according to the spatial position relation and distance change between the virtual collision detection sphere and triangles, with the triangle edges and three vertices being considered. Compared to the methods that use the native intersector of OpenSceneGraph (OSG) to obtain the collision point coordinates, the calculation efficiency of the proposed method is greatly improved. Usually, when there is a big split/pit in the scene, the viewpoints will fly off the scene due to the fall of the collision detection sphere, or the region interior cannot be accessed when the entrance of some local region (e.g., internal grotto) of the scene is too small. These problems are solved in this paper through 3D scene-path training and by self-adaptively adjusting the radius of the virtual collision detection sphere. The proposed 3D roaming and collision detection method applicable for massive spatial data overcomes the limitation that the existing roaming and collision detection methods are only applicable to 3D scenes with a small amount of data and simple models. It provides technical supports for freewill browsing and roaming of indoor/outdoor and overground/underground of the 3D scene in cases of massive spatial data.

Example 9: Philosophy

Many studies have demonstrated that moral philosophies, such as idealism and relativism, could be used as robust predictors of judgements and behaviours related to common moral issues, such as business ethics, unethical beliefs, workplace deviance, marketing practices, gambling, etc. However, little consideration has been given to using moral philosophies to predict environmentally (un)friendly attitudes and behaviours, which could also be classified as moral. In this study, we have assessed the impact of idealism and relativism using the Ethics Position Theory. We have tested its capacity to predict moral identity, moral judgement of social vs. environmental issues, and self-reported pro-environmental behaviours. The results from an online MTurk study of 432 US participants revealed that idealism had a significant impact on all the tested variables, but the case was different with relativism. Consistently with the findings of previous studies, we found relativism to be a strong predictor of moral identity and moral judgement of social issues. In contrast, relativism only weakly interacted with making moral judgements of environmental issues, and had no effects in predicting pro-environmental behaviours. These findings suggest that Ethics Position Theory could have a strong potential for defining moral differences between environmental attitudes and behaviours, capturing the moral drivers of an attitude-behaviour gap, which continuously stands as a barrier in motivating people to become more pro-environmental.

Color codes used in the abstract examples below

Background and objectives, Methods and approach, Results, Conclusions and broader implications

Example 10: Anthropology

The replacement of Neanderthals by Anatomically Modern Humans has typically been attributed to environmental pressure or a superiority of modern humans with respect to competition for resources. Here we present two independent models that suggest that no such heatedly debated factors might be needed to account for the demise of Neanderthals. Starting from the observation that Neanderthal populations already were small before the arrival of modern humans, the models implement three factors that conservation biology identifies as critical for a small population's persistence, namely inbreeding, Allee effects and stochasticity. Our results indicate that the disappearance of Neanderthals might have resided in the smallness of their population(s) alone: even if they had been identical to modern humans in their cognitive, social and cultural traits, and even in the absence of inter-specific competition, Neanderthals faced a considerable risk of extinction. Furthermore, we suggest that if modern humans contributed to the demise of Neanderthals, that contribution might have had nothing to do with resource competition, but rather with how the incoming populations geographically restructured the resident populations, in a way that reinforced Allee effects, and the effects of inbreeding and stochasticity.

References:

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Example 4: Stachl CN, Baranger AM (2020) Sense of belonging within the graduate community of a research-focused STEM department: Quantitative assessment using a visual narrative and item response theory. PLoS ONE 15(5): e0233431. https://doi.org/10.1371/journal.pone.0233431

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Example 10: Vaesen K, Scherjon F, Hemerik L, Verpoorte A (2019) Inbreeding, Allee effects and stochasticity might be sufficient to account for Neanderthal extinction. PLoS ONE 14(11): e0225117. https://doi.org/10.1371/journal.pone.0225117

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