

Ecology Department, Institute of Amelioration, Water Resources, and Construction
Russian State Agrarian University
Moscow Timiryazev Agricultural Academy
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Writing Scientific Papers for Journal Publication



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My Relevant Experience

(14 Sept 2023)

- Environmental Science (Toxicology, Restoration, Resource Reuse)
- > 800 SCI papers
- Google Scholar total citations: 68,864, h-index 133
- Scopus total citations: 47,522, h-index 111
- Ranked 6 (Career-long) under Environmental Science, World's Top 2% Highly Cited Authors (Stanford U, 2020, 2021, 2022)
- Ranked 1 under Environmental Science in China (Research.Com, 2023)
- Ph.D. (Durham), D.Sc. (Durham), D.Sc. (Strathclyde), based on published papers, 1992 & 2004, respectively
- Editor-in-Chief, EGAH (Springer Nature) (2002-2022)
- Principal Supervisor: 70+ M.Phil./Ph.D. students
- Professional profile at EdUHK:
<https://repository.eduhk.hk/en/persons/ming-hung%E9%BB%83%E9%8A%98%E6%B4%AA-wong>

Environmental Geochemistry And Health (EGAH)

OFFICIAL JOURNAL of the Society of Environ Geochem & Health (SEGH)

<https://www.springer.com/journal/10653>

AIMS & SCOPE

- Broad field of environmental geochemistry
- Links between the natural or disturbed chemical composition of the earth's surface & the health of plants, animals & people

IMPACT FACTOR: 4.609 (2020), five years IF: 4.677 (2020)

JOURNAL RANKING BY SUBJECT CATEGORIES

Water Resources: 15/98, Q1 Journal

Public, Environmental & Occupational Health: 40/203, Q1 Journal

Environmental Engineering 21/54, Q2 Journal

Environmental Science: 81/274, Q2 Journal

Table of Contents

- **1. Introduction**
- **2. Different Parts of a Paper:
Purposes & How to Write Them**
- **3. Choosing Journals, Submission**
- **4. Reviewing Process, Revision**
- **5. Ethical Issues**

This talk was delivered in China (HK, Macao, Taiwan), Australia, India, Malaysia, S Korea, Thailand, Africa (British Academy Writing Workshop to Early Career Scheme scientists), Vietnam & Russia

- **General organization of a paper**

- (1) **Abstract**

- (2) **Introduction**

- (3) **Methods**

- (4) **Results / Results & Discussion**

- (5) **Discussion / Conclusion**

- (6) **Literature Cited**

1. Each section has a clearly defined purpose

2. We should start by making good versions of all figures & tables

3. We should then write in the following order:

Methods, Results, Discussion, Introduction, Abstract

Writing the paper: key points

- **Introduction- Strong**
 - Engage the reader
 - Set the scene, explain why the work is important, and state the aim of the study
- **Methods- Clear, logically organised, complete**
 - Provide enough information to allow assessment of results
- **Results- Clear, concise**
 - Avoid repetition between text, tables, & figures
- **Discussion- Relevant**
 - Were aims achieved?
 - Discuss significance & implications of results

• Different Types of Title

(1) Indicative titles indicate the subject matter of a paper but give no indication of any results obtained or conclusions drawn

- e.g. *The effectiveness of bed nets in controlling mosquitoes at different seasons of the year.*

(2) Informative titles

- e.g. *Bed nets control mosquitoes most effectively when used in the rainy season.*

(3) Question-type titles

- e.g. *When are bed nets most effective when used to control mosquitoes?*

(4) Main-subtitle (series) type

- This is not liked by editors because if they accept the first paper they will be duty-bound to accept the rest.
- e.g. *The effect of bed nets on mosquitoes: 1. Their effectiveness when used only in the rainy season.*

Try to Make Titles More Attractive

	Title	Journal	Yr	TC
1	Export of toxic chemicals – A review of the case of uncontrolled electronic-waste recycling	Environ Pollut	2007	875
2	Spatial distribution of PBDEs & PCDD/Fs in soil & combusted residue at Guiyu...	Environ Sci Technol	2007	799
3	Effects of biofertilizer containing N-fixer, P & K solubilizers & AM fungi on maize growth: A greenhouse trial	Geoderma	2005	1312
4	Ecological restoration of mine degraded soils, with emphasis on metal contaminated soils	Chemosphere	2003	1206
5	Accumulation of Pb, Zn, Cu & Cd by 12 wetland species thriving in metal-contaminated sites in China	Environ Pollut	2004	744
6	Shark fin, a symbol of wealth & good fortune may pose health risks: The case of Hg	EGAH	2014	20+

Review Papers – Attract More Citations?

1	Bisphenol A (BPA) in China: A review of sources, environmental levels, & potential human health impacts	Environ Int	2012	903
2	Electronic waste management approaches: An overview	Waste Man	2013	7009
3	Pharmaceuticals & personal care products (PPCPs): A review on environmental contamination in China	Environ Int	2013	942
4	Application of Spirulina in aquaculture: A review on wastewater treatment & fish growth	Rev in Aquacult	2020	?
5	Direct & indirect effects of microplastics on bivalves, with a focus on edible species: A mini-review	Crit Rev in EST	2020	?
6	Use of biochar as feed supplements for animal farming	Crit Rev in EST	2020	?
7	Health impacts of indoor pollution from household solid fuel on children and women	JHM	2021	?

Citation Contribution of Articles (By Type)

Publication Type	No. of articles	No. of Citations	Average No. of Citation to the Article type	Contribution of Citations by article type	No. of 0-Cited articles among article type	% of 0-cited Articles among article type
	by article type	by article type				
Articles	318	1,038	3.26	64%	59	19%
Reviews	24	246	10.25	15%	1	4%
Conference Papers	74	331	4.47	20%	5	7%
Total	416	1,615			65	

Key Words

- A list of 3 to 5 key words, or short phrases are required for indexing
- Some journals further specify that words already in the title not be included
- **Example 1**
- Variation in arsenic, lead and zinc tolerance and accumulation in six populations of *Pteris vittata* from China
- Chinese brake fern, *Pteris semipinnata*, Heavy metal Tolerance, Accumulation, Intraspecific variation
- **Example 2**
- A comparison of aluminum levels in tea products from Hong Kong markets and in varieties of tea plants from Hong Kong & India
- *Camellia sinensis*, Infusion, Aluminum, Alzheimer's disease, Ti Kuan Yin

High Lights

- **Indicate significant findings obtained** – e.g.
- Wang W, Zheng J, Chan CY, Huang MJ, Wong MH (2014). **Health risk assessment of exposure to polybrominated diphenyl ethers (PBDEs) contained in residential air particulate & dust in Guangzhou & Hong Kong.** Atmos Environ 89: 796-86.
- PBDEs profiles & levels varied with residential particle types and locations.
- PM2.5 accumulated the highest PBDEs among residential particles especially BDE-209.
- Sorption is the dominant mechanism for PBDEs partitioning in dust & air particles.
- PBDE profiles stay constant from urban to suburban sites due to indoor sources.
- Dust ingestion was the main PBDE exposure route for toddlers.

Authors (i): Authorship

- Authors should contribute.... to be qualified as a co-author:
- **Design, Exercise, Analysis, Writing**
- Inclusion of someone who does not deserve authorship & exclusion of someone who does are equal offenses
- All authors must read & approve the final version of the paper before it is submitted
- Order reflects authors' amount of input on paper.
- Supervisor - as the **corresponding author**, his/her postgraduate student - as the **1st author**
- **Only one 1st author, & one corresponding author**
- **Full name** (is preferred, some journals want initials).
- Make sure you follow the journal guideline (usually surname last).
- Alan JM Baker or **AJM** Baker
- John P Gisey or **JP** Gisey
- Ming Hung Wong (Ming-Hung Wong, Minghung Wong, or **MH** Wong)

Who did what?

Helen C Eborall, *post-doctoral research fellow*¹, **Simon J Griffin**, *programme leader*², **A Toby Prevost**, *medical statistician*¹, **Ann-Louise Kinmonth**, *professor of general practice*¹, **David P French**, *reader in health behaviour interventions*³, **Stephen Sutton**, *professor of behavioural science*¹

- **Contributors:** SS, DPF, ATP, A-LK, & SJG conceived & designed the original protocol. All authors were involved in amending the protocol. HCE coordinated the study throughout. Data entry was carried out by Wyman Dillon Ltd, Lewis Moore, & HCE. HCE cleaned the data & ran a preliminary analysis with input from Tom Fanshawe. ATP analysed the data. ADDITION trial data were supplied by Lincoln Sargeant & Kate Williams. HCE wrote the first draft of the manuscript with ATP & SS. All authors contributed to subsequent & final drafts. HCE is the guarantor of the paper.

Writing the Abstract

Abstract should answer 3 questions:

- **Why** did you study it?
- **How** did you study it?
- **What** did you find & what does it mean?

Basic contents

- State principal **objective** & scope of the investigation
- Describe **methodology** employed
- Summarize **results**
- State principal **conclusions**

-Should be **specific, concise** & must stand along from the rest of the paper

-Should include **no abbreviations or citations** of other papers

Heavy Metals Concentrations of Surface Dust from e-Waste Recycling & Its Human Health Implications in SE China

Leung AOW, Duzgoren-Aydin N, Cheung KC, Wong MH (2008). *EST* 42: 2674–80.

The recycling of printed circuit boards in Guiyu, China, a village intensely involved in e-waste processing, may present a significant environmental and human health risk. To evaluate the extent of heavy metals (Cd, Co, Cr, Cu, Ni, Pb, Zn) contamination from printed circuit board recycling, surface dust samples were collected from recycling workshops, adjacent roads, a schoolyard, and an outdoor food market. ICP-OES analyses revealed elevated mean concentrations in workshop dust (Pb 110000, Cu 8360, Zn 4420, and Ni 1500 mg/kg) and in dust of adjacent roads (Pb 22600, Cu 6170, Zn 2370, and Ni 304 mg/kg). Lead and Cu in road dust were 330 and 106, and 371 and 155 times higher, respectively, than non e-waste sites located 8 and 30 km away. Levels at the schoolyard and food market showed that public places were adversely impacted. Risk assessment predicted that Pb and Cu originating from circuit board recycling have the potential to pose serious health risks to workers and local residents of Guiyu, especially children, and warrants an urgent investigation into heavy metal related health impacts. The potential environmental and human health consequences due to uncontrolled e-waste recycling in Guiyu serves as a case study for other countries involved in similar crude recycling activities.

ANOTHER TYPE OF ABSTRACT

Study skills & their correlation with academic satisfaction & achievement among medical & pharmacy students in K Univ of Med Sci (2013)

Introduction: Study skills & students' satisfaction with their performance positively affect their academic achievement. The current research was carried out to investigate the correlation of study skills with academic achievement among medical & pharmacy students in 2013.

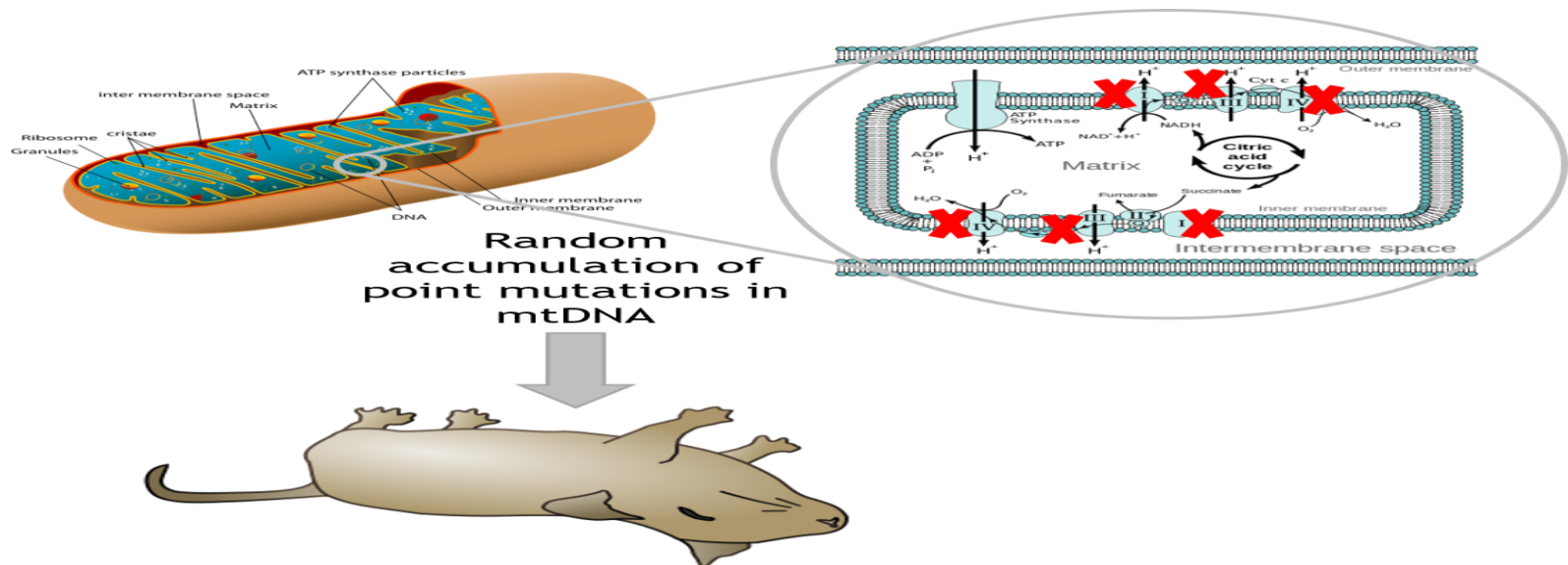
Methods: This descriptive-analytical study was conducted on 148 students of basic medical sciences & pharmacy through convenience samplings. Data were collected by a valid and reliable questionnaire, consisting of two sections: Demographic information and questions about daily study hours, study skills in six domains, & students' satisfaction with study skills. Collected data sets were analyzed by SPSS-16 software.

Results: In total, 10.9% of students were reported to have favorable study skills. The minimum score was found for preparation for the examination domain. Also, a significantly positive correlation was observed between students' study skills and their Grade Point Average (GPA) OF PREVIOUS TERM ($P=0.001$, $R=0.269$) and satisfaction with study skills ($P=0.001$, $r=0.493$).

Conclusion: The findings indicated that students' study skills need to be improved. Given the significant relationship between study skills & GPA, as an index of academic achievement, & satisfaction, it is necessary to promote the students' study skills. These skills are suggested to be reinforced, with more emphasis on weaker domains.

Graphical Abstract

- A graphical abstract should be a one-image file & should visualize one process or make one point clear.
- For ease of browsing, the graphical abstract should have a clear start & end, preferably “reading” from left to right, or top to bottom.
- Try to reduce distracting & cluttering elements as much as possible.



Introduction (i)

- Provide the necessary background information to put your work into **context**
- It should be clear from the introduction:
 - **Why** the current work was performed?
 - - aims, & - significance
 - **What** has been done before?
 - **How** does your paper add to knowledge?

Introduction (ii)

DO – things you should do

You should-

- (1) Consult the Guide for Authors
- (2) “Set the scene”, outline “the problem”, & “hypotheses”
- (3) Ensure that the literature cited is balanced, up to date & relevant
- (4) Define any non-standard abbreviations & jargon (words used by a particular profession)

Introduction (iii)

- **DON'T – things you should not do**

You should not

- (1) Write an extensive review of the field
- (2) Cite too much of your own work (or your colleagues), or work that supports your findings; while ignoring contradictory studies or work by competitors
- (3) Describe methods, results or conclusion (in too much detail) other than to outline what was done & achieved in the final paragraph

Materials & Methods (1)

Experimental Procedures

- Describe **how, when, where, what** you did
- Give details so the competent worker can repeat experiments
- State all controls, treatments & replicates that you tested (with sufficient treatments & replicates)
- Details on **QA/QC** (quality assurance & quality control) for chemical **analyses** – standard reference materials, code number, where obtained, blank, etc.
- Whenever **hazardous materials & dangerous methods** were used, the necessary precautions should be stated
- If the experiments dealt with animals (with a backbone) & humans- **“Approval by Ethical Committee”** is highly essential

Materials & Methods (ii)

For experiments dealing with living organisms

- Both “Common name” & “Latin name” are necessary - genus, species, strain, cultivar
- Characteristics, age & source of all organisms
- Growth conditions, chemicals, lighting, temperature, diet apparatuses

For ecological experiments

- Maps or photographs showing sampling locations
- Collection of field samples & pretreatment, etc.

For plant trials

- Random block design, temperature, relative humidity, light intensity, light/dark cycle,
- water regime, nutrient solution, growth substrates, pot size, number of pots/treatments.

Materials & Methods (iii)

- **Published methods** should be cited appropriate references (the original references, or any published modifications)
- If you have **modified the method**, clearly indicate which parts have been modified
- **New methods**/Novel methods should provide all information on new techniques, equipment
- Precisely describe measurements & analysis
- Use ordinary **statistical methods** (various packages) without comment: $\text{mean} \pm \text{SD}$, the level of significance ($p < 0.05$)
- **For better organization- use subheadings**

Experimental Organisms, Chemical solutions, Microscopy, Sampling Techniques, Statistical Analyses, etc.

Results (i)

- Entire paper stands on the results section
- The shortest section: Simple & direct
- Present data from the present study
- Made no comparison with data in other papers
- No discussion
- Use figures/tables to support generalizations about data
- Avoid redundancy – avoid repetition with the same data presented in both tables or figures
- Do not describe data in detail in the text, which have been presented in a table or figure
- Guide reader & points to trends & patterns
- Support conclusions drawn from numerical data, with brief statements of statistical criteria used

Results (ii)

A description of the experimental approach and the main findings

DO – things you should do

You should

- (1) Use figures & tables to summarize data
- (2) Include enough statistical analysis to persuade the reader
- (3) Be sure that the text, figures, & tables are consistent with one another
- (4) Emphasize only important observations that will answer the question or solve the problem raised in your introduction
- (5) Be selective about your results (supplemental material section)

Results (iii)

DON'T – things you should not do

You should not

- (1) Include “discussion” or “introduction” unless it is truly essential
- (2) Repeat material that is already in the **Methods** section
- (3) Repeat the legends for figures or the titles of tables in the text
- (4) Repeat the data already presented in the figures & tables

Tables & Figures

Most effective in presenting data

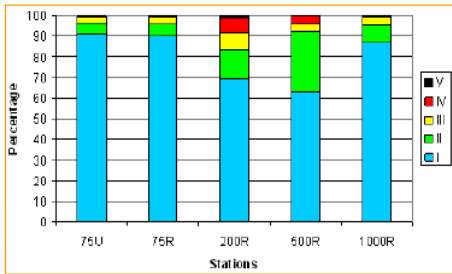
But

- **Neatness counts** – you should design them carefully
- As a **rule**, a table or a figure should be deleted if it can be replaced with one or two sentences in the text & a few numbers

Four rules for making figures

- (1) Design your figures carefully & make them in the final size you desire in the published paper
- (2) Make all your figures uniform – same line style, same font & font sizes, etc.
- (3) No unnecessary text in the figure
- (4) If a colleague cannot understand, you probably need to redesign

Graphics



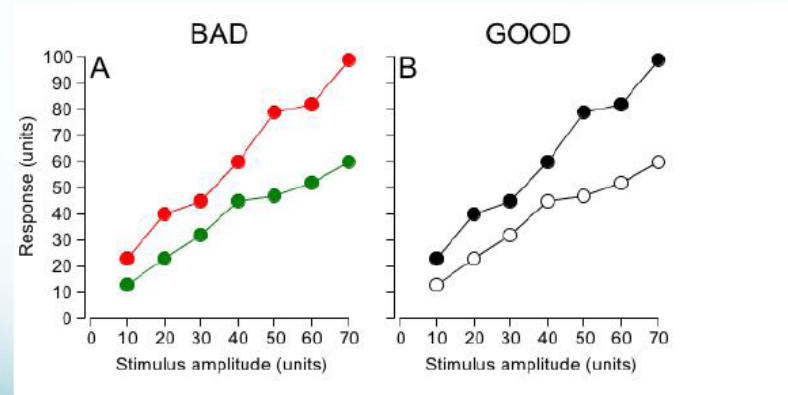
The figure and table show the same information, but the table is more direct and clear and uses less space.

ECOLOGICAL GROUP					
Station	I	II	III	IV	V
75U	91.3	5.3	3.2	0.2	0.0
75R	89.8	6.1	3.6	0.5	0.0
200R	69.3	14.2	8.6	6.8	1.1
500R	63.0	29.5	3.4	4.2	0.0
1000R	86.7	8.5	4.5	0.2	0.0



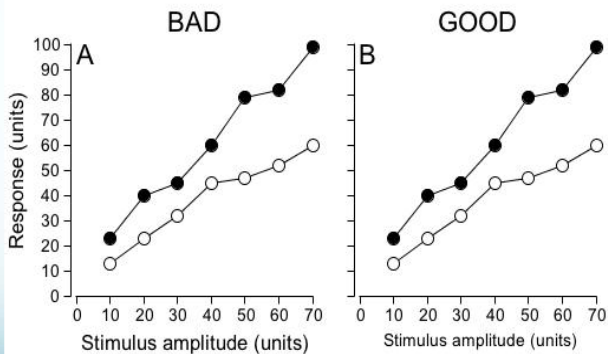
Graphics

Use color only when it adds to the presentation.



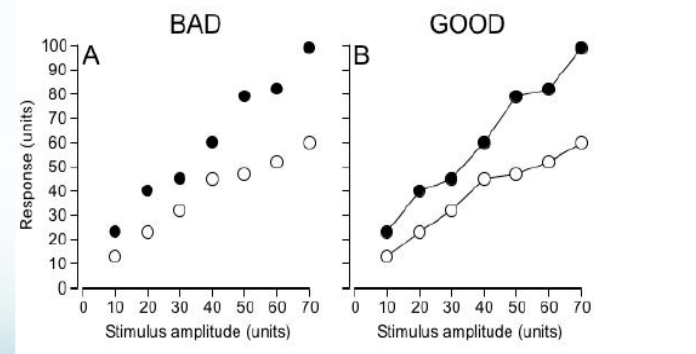
Graphics

Make all fonts the same size (except "A" and "B")



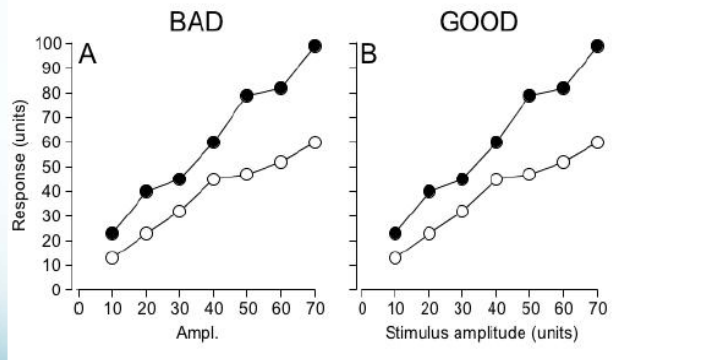
Graphics

Connecting the dots makes the graph easier to read



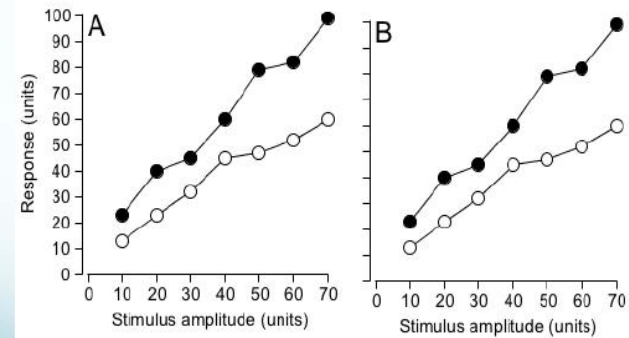
Graphics

Use axis labels and legends that are as descriptive as space allows



Graphics

Align graphs perfectly with each other



Graphics

Make companion graphs the same size

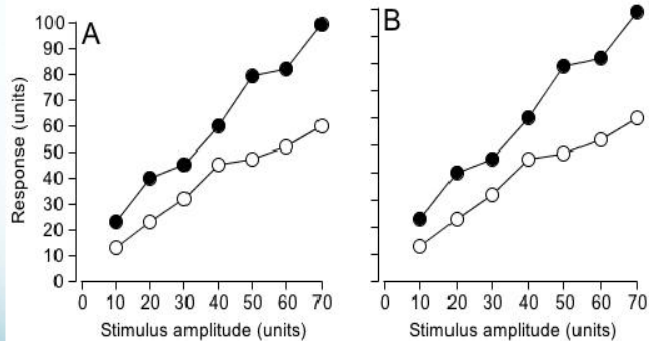


Figure legends

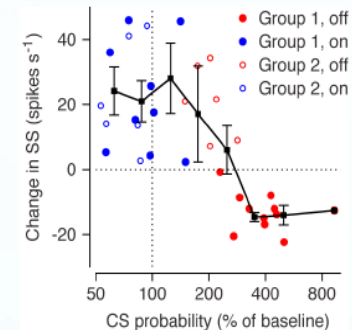


Figure 4. Quantitative relationship between complex spike probability in learning trials and learned changes in simple spike activity in probe trials. Each point plots the results of one learning experiment on one Purkinje cell and shows averages across all the trials in the learning block. Analysis intervals for the complex spike probability and the learned change in simple spike firing are indicated in Figure 3. Filled and open symbols indicate data from group 1 (n=11) and group 2 (n=6) Purkinje cells; blue and red symbols indicate learning in the on-direction and off-direction of the Purkinje cell under study.

- **Graphics software**
- http://en.wikipedia.org/wiki/Scientific_writing
- **Computer algebra systems**
- **Numerical software**
- **Plotting programs (graphing programs)**
- **Statistical software**

Discussion (i)

- Tell readers **what results mean & why they are important.**
- Its primary purpose is to indicate **relationships among observed facts.**
- **Interpret results relative to objectives** stated in the introduction.
- **Is there evidence in your data to support the hypothesis you tested?**
Why or why not?

Discussion (ii)

- **Quote relevant references** in the text.
- Try to avoid old references.
- Do not quote too many references for one statement (not more than 3).
- **End of Discussion -Concluding remarks (or a separate section on Conclusions)** regarding:
 - (i) significance of work (based on results you obtained),
 - (ii) whether or not the data supports or disproves the hypothesis, &
 - (iii) suggestions for future studies.
- Keep your **language as simple & direct** as much as possible.

Acknowledgement

Acknowledge anyone who has helped you with the study:

- Researchers who **supplied materials or software**.
- Anyone who helped with the **writing or English** or offered **critical comments** about the content.
- Anyone who provided **technical help**.
- State why people have been acknowledged & seek their permission.
- Acknowledge **sources of funding**, including any grant or reference (code) numbers. **This is very important – a requirement by funding agencies (evidence of recognized output)**

References

CHECK the Guide for Authors for the correct format.

Check **accuracy** of each citation - most mistakes are made by misspelled names, added or deleted names, incorrect dates, mangled titles, wrong journals, & incomplete information.

TRY TO AVOID (important!):

- (1) Personal communications, publications in doubt (written by Green Groups), unpublished data & submitted manuscripts not yet accepted.
- (2) Outdated papers.
- (3) Citing articles published only in the local language.
- (4) Excessive self-citation, journal self-citation, & citations from the same region.

Reference Management Software

Reference management software, citation management software, or personal bibliographic management software
Modern reference management packages can usually be integrated with word processors

Examples: [Endnote](#), [BibTeX](#) ;
Internet source for literature: [ISI/Web of Science](#)

Supplementary Materials

Materials supportive of the main text

- Data
- Code
- Video data
- Avoid supplementary material. If it is important to the paper, it should be in the paper.

保龄球馆

Balling Room

桑拿浴

Sana Room

游泳馆

Swimming Pool

客用电梯

Guess Lift

商务中心

Business centre

美容美发中心

Borber Shop

商品部

Shop

Avoid making silly mistakes

- Balling- Bowling
- Sana- Sauna
- Guess- Guest
- Borber- Barber

Proofread before Submitting

- ✓ Are terms used consistently throughout?
- ✓ Do numbers in abstract match numbers in text and tables?
- ✓ Do citations in the text match references?
- ✓ Is Grammar acceptable?

Submit with the consent of all authors and to only one journal

English Editing – Seeking Help

- From a native English speaker who knows the science
- From an editorial company

A well-written paper will get more favorable reviews than a poorly written one.

Don't rely on reviewers to improve your paper.

Choosing Journals

- Check that the **scope of the paper** is appropriate for the selected journal- reject without review is a common practice
- Look at **your references** – these will help you narrow your choices.
- **Review** recent publications in **each candidate journal**. Find out the hot topics, the accepted types of articles, etc.
- Ask yourself the following questions:
 - Is the journal **peer-reviewed**?
 - Who is this journal's **audience**?
 - What is the **average time to print**?
 - What is the journal's **Impact Factor**?
- Decide on **one** journal. DO NOT submit to multiple journals.

Cover Letter

- This is your chance to speak to the editor directly.
- **Keep it brief**, but convey the particular **importance of your manuscript** to the journal.
- Try to **convince the journal editor** that they should publish your study, so it is worth investing time at this stage.
- Have an experienced colleague help

- Letter to the editor (example)



Dear Professor

Please find enclosed our manuscript “*Cluster Formation and Rheology of Photoreactive Nanoparticles*”.

We studied *the cluster formation of photoreactive nanoparticles upon irradiation, and the effect of this process on the rheological behavior of dilute colloidal dispersions.*

Since our work should be of interest to many readers of, we have decided to submit our paper to your journal, hoping you will find it acceptable for publication.

Sincerely

.....

What editors look for in a manuscript

- Quality
 - good science: well-planned, well-executed study
 - good presentation
- Significance & originality
- Consistent with the scope of the journal
- Demonstrated broad interest to the readership
- Will it cite?
- Well written 'story'
- Author enthusiasm

The Refereeing Process

- Some journals have only Editor-in-Chief, some Co-Editor-in-Chiefs, Associate Editors
- (1) assign a coordinating editor, (2) send paper to 2-4 referees
- Referees are crucial to quality control – they play a vital role in the scientific process
- Selection criteria
 - Knowledge of the field, expertise, reputation
 - Specific recommendations
 - Editor's experience of referee's style
 - Reliability
- Referee selection: two or three referees
 - Referees are selected for each paper
 - Use cited references, keyword searches, related papers
 - ISI Web of Science, web (Google Scholar), journal/publisher databases
 - Editorial Board member recommendations

Suggest Reviewers

- Help the Editor to move your manuscript faster.
- You may suggest reviewers & exclude people who you think are inappropriate due to conflict of interest or other issues.
- You can find potential reviewers (& contact details) from articles in your specific subject area (e.g., your references).
- The reviewers should represent at least two regions of the world.
- They should not be your supervisor or close friends.
- Be prepared to suggest 3-6 potential reviewers.

Understanding reviews: What makes a good review

- Good reviews provide the editor with the information on which a decision can be based
- They tell the editor:
 - What is interesting about the paper
 - How the results are significant
 - What contribution the paper makes to the field
 - What can be done to improve the paper
 - If the paper is not publishable & why

Recommendation & Decision

Recommendations to Editor-in-Chief (based on comments from at least 2 reviewers):

- a) **Reject without review**
 - b) **Accept with (minor/major) revision**
 - c) **Reject after review**
 - d) **Not suitable, but will be reconsidered after major revision**
- Decision with comments will be released to authors (1st author or corresponding author)

Very important:

- a) Address all the items raised by reviewers, point by point
- b) Indicate where changes have been made on the revised paper
- c) Re-submit the paper within the deadline specified

(1) If you were invited to revise & resubmit

- Write a detailed response to the comments.
- Respond to all points; even if you disagree with a reviewer, provide a polite, scientifically solid reply rather than ignore their comment.
- Make changes in the revised paper.
- Provide page & line numbers when referring to revisions made in the manuscript.
- Perform additional calculations, computations, or experiments if required; these usually make the final paper stronger

(2) If your paper was rejected with an invitation to resubmit

- Try to understand what the reviewers & editors really want you to do.
- Do not take shortcuts. Your paper will be rejected if you make only cosmetic changes.
- Once you have decided how to proceed, do any required additional work & then proceed as indicated for a revision.

(3) If your paper was rejected without apparent reason

- Try to understand why the paper was rejected.
- You always have the option to appeal, but you will succeed only if you have a very good case.
- If you decide to appeal, explain how you would modify the paper to address the reviewers' criticisms.
- Most appeals are unsuccessful, so be sure that you have a strong case before initiating this time-consuming process.
- Do not annoy the editor.
- Whatever you do, make sure your comments are clear.

(4) Accepting Rejection

Do not take it personally!

- Try to understand why?
- Evaluate -will your paper meet the journal's requirements with the addition of more data or is another journal more appropriate?
- Do not resubmit elsewhere without addressing the reasons for rejection & checking the new Guide for Authors.

A possible strategy for submitting elsewhere

- In your cover letter, declare that the paper was rejected & name the journal.
- Include the referees' reports & show how each comment has been addressed.
- Explain why you are submitting the paper to this journal; is it a more appropriate journal?

***Unethical* behavior includes:**

- (1) Improper use of human subjects & animals
- (2) Improper author contribution

(3) Multiple Submission

- Multiple submissions save your time but waste editors' time.
- Competing journals exchange information on suspicious papers.
- You must not send your manuscripts to a 2nd journal **UNTIL** you receive the final decision from the 1st journal.
- The editorial process of your manuscripts will be completely stopped, if the duplicated submissions are discovered.

(4) Redundant Publication

- Do not submit for consideration in another journal a previously published paper or previously published data.
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RETRACTED: Matching pursuit-based approach for

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This article has been retracted at the request of the Editor-in-Chief and Publisher. <http://www.elsevier.com/locate/withdrawalpolicy>.

Reason: This article is virtually identical to the previously published article "A new algorithm for SNR improvement in ultrasonic NDT", *Independent Nondestructive International*, volume 38 (2005) 453 – 458 authored by N. Ruiz-Reyes, P. Vera-Candeas, J. Curpián-Alonso, J.C. Cueva-Martínez, J.C. Mata-Campos and J.C. Cuevas-Martínez.

the echoes issuing from the flaws to be detected. Therefore, it cannot be cancelled by classical time averaging or matched band-pass filtering techniques.

Many signal processing techniques have been utilized for signal-to-noise ratio (SNR) improvement in ultrasonic NDT of highly scattering materials. The most popular one is the split spectrum processing (SSP) [1–3], because it makes possible real-time ultrasonic test for industrial applications, providing quite good results. Alternatively to SSP, wavelet transform (WT) based denoising/detection methods have been proposed during recent years [4–8], yielding usually to higher improvements of SNR at the expense of an increase in complexity. Adaptive time-frequency analysis by basis pursuit (BP) [9,10] is a recent technique for decomposing a signal into an optimal superposition of elements in an over-complete waveform dictionary. This technique and some other related techniques have been successfully applied to denoising ultrasonic signals contaminated with grain noise in highly scattering materials [11,12], as an alternative to the WT technique, the computational cost of the BP algorithm being the main drawback.

In this paper, we propose a novel matching pursuit-based signal processing method for improving SNR in ultrasonic NDT of highly scattering materials, such as steel and composites. Matching pursuit is used instead of BP to reduce the complexity. Despite its iterative nature, the method is fast enough to be real-time implemented. The performance of the proposed method has been evaluated using both computer simulation and experimental results, even when the input SNR (SNR_{in}) is lower than 0dB (the level of echoes from the structures is above the level of the echoes).

2. Matching pursuit

Matching pursuit was introduced by Mallat and Zhang [13]. Let us suppose an approximation of the ultrasonic backscattered signals $s[n]$ as a linear expansion in terms of functions $g_i[n]$ chosen from an over-complete dictionary. Let H be a Hilbert

space. We define the over-complete dictionary as a family $D = \{g_i; i = 0, 1, \dots, L\}$ of vectors in H , such as $\|g_i\| = 1$.

The problem of choosing functions $g_i[n]$ that best approximate the analysed signal $s[n]$ is computationally very complex. Matching pursuit is an iterative algorithm that offers sub-optimal solutions for decomposing signals in terms of expansion functions chosen from a dictionary, where l^1 norm is used as the approximation metric because of its mathematical convenience. When a well-designed dictionary is used in matching pursuit, the non-linear nature of the algorithm leads to compact adaptive signal models.

In each step of the iterative procedure, vector $g_i[n]$ which gives the largest inner product with the analysed signal is chosen. The contribution of this vector is then subtracted from the signal and the process is repeated on the residual. At the m th iteration the residue is

$$r^m[n] = \begin{cases} s[n] & m = 0, \\ s^{m-1}[n] + \alpha_{k(m)} g_{k(m)}[n], & m \neq 0, \end{cases} \quad (1)$$

where $\alpha_{k(m)}$ is the weight associated to optimum atom $g_{k(m)}[n]$ at the m th iteration.

The weight α_i^m associated to each atom $g_i[n] \in D$ at the m th iteration is introduced to compute all the inner products with the residual $r^m[n]$:

$$\alpha_i^m = \frac{\langle r^m[n], g_i[n] \rangle}{\langle g_i[n], g_i[n] \rangle} = \frac{\langle r^m[n], g_i[n] \rangle}{\|g_i[n]\|^2} = \langle r^m[n], g_i[n] \rangle. \quad (2)$$

The optimum atom $g_{k(m)}[n]$ (and its weight $\alpha_{k(m)}$) at the m th iteration are obtained as follows:

$$g_{k(m)}[n] = \underset{g_i[n] \in D}{\operatorname{argmin}} \|\langle r^m[n], g_i[n] \rangle\|^2 = \underset{g_i[n] \in D}{\operatorname{argmax}} |\alpha_i^m|. \quad (3)$$

The computation of correlations $\langle r^m[n], g_i[n] \rangle$ for all vectors $g_i[n]$ at each iteration implies a high computational effort, which can be substantially reduced using an updating procedure derived from Eq. (1). The correlation updating procedure [13] is performed as follows:

$$\langle r^{m+1}[n], g_i[n] \rangle = \langle r^m[n], g_i[n] \rangle - \alpha_{k(m)} \langle g_{k(m)}[n], g_i[n] \rangle. \quad (4)$$

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End

