July 6, 2021

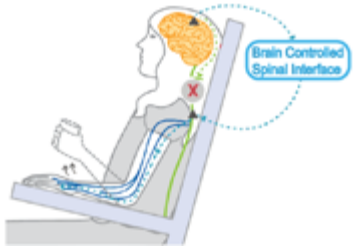
Announcements

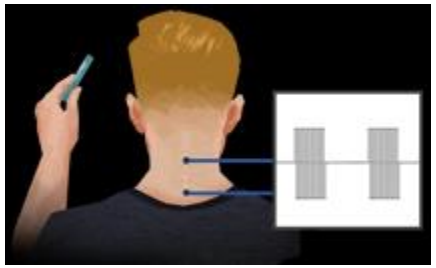
Week 4

Next Week:
- Figures (Tue)
- Inkscape (Tue)
- Neuroethics (Thu)

Scientific Communications!

Dr. Chet Moritz





Letters of Recommendation

Scientific Communications!

1. Why is it important to communicate research?

Because: We should | We want to | We have to

2. Who are (or will be) your audiences?

Peers, editors, reviewers, mentors, public, employers, family

3. Where will you communicate your research?

"Elevator"

Conferences, classes, journals, grant applications, interviews

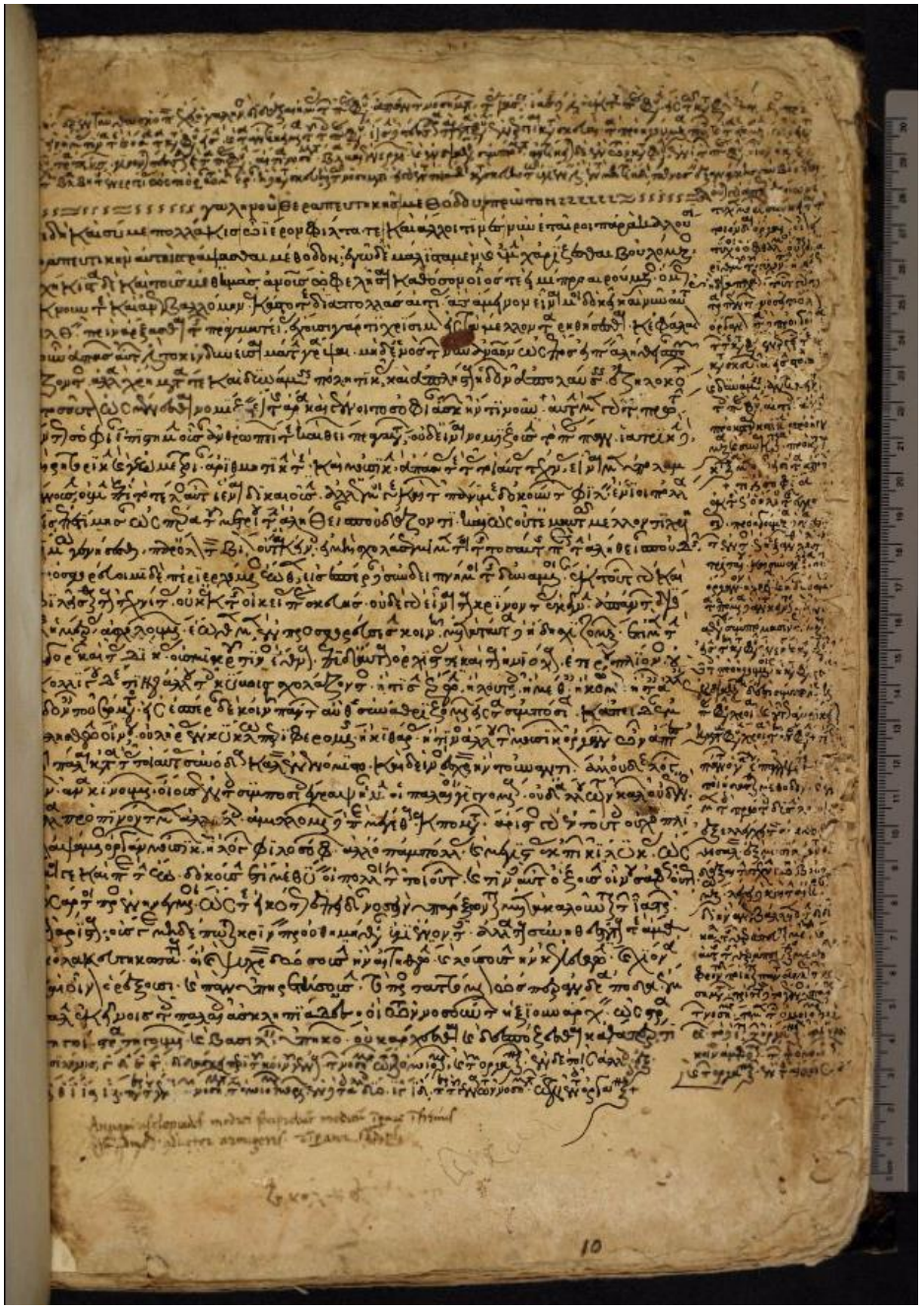
4. When will you present your research?

Research completed, in progress, this summer, after summer

5. How (methods/modes) will you communicate your research?

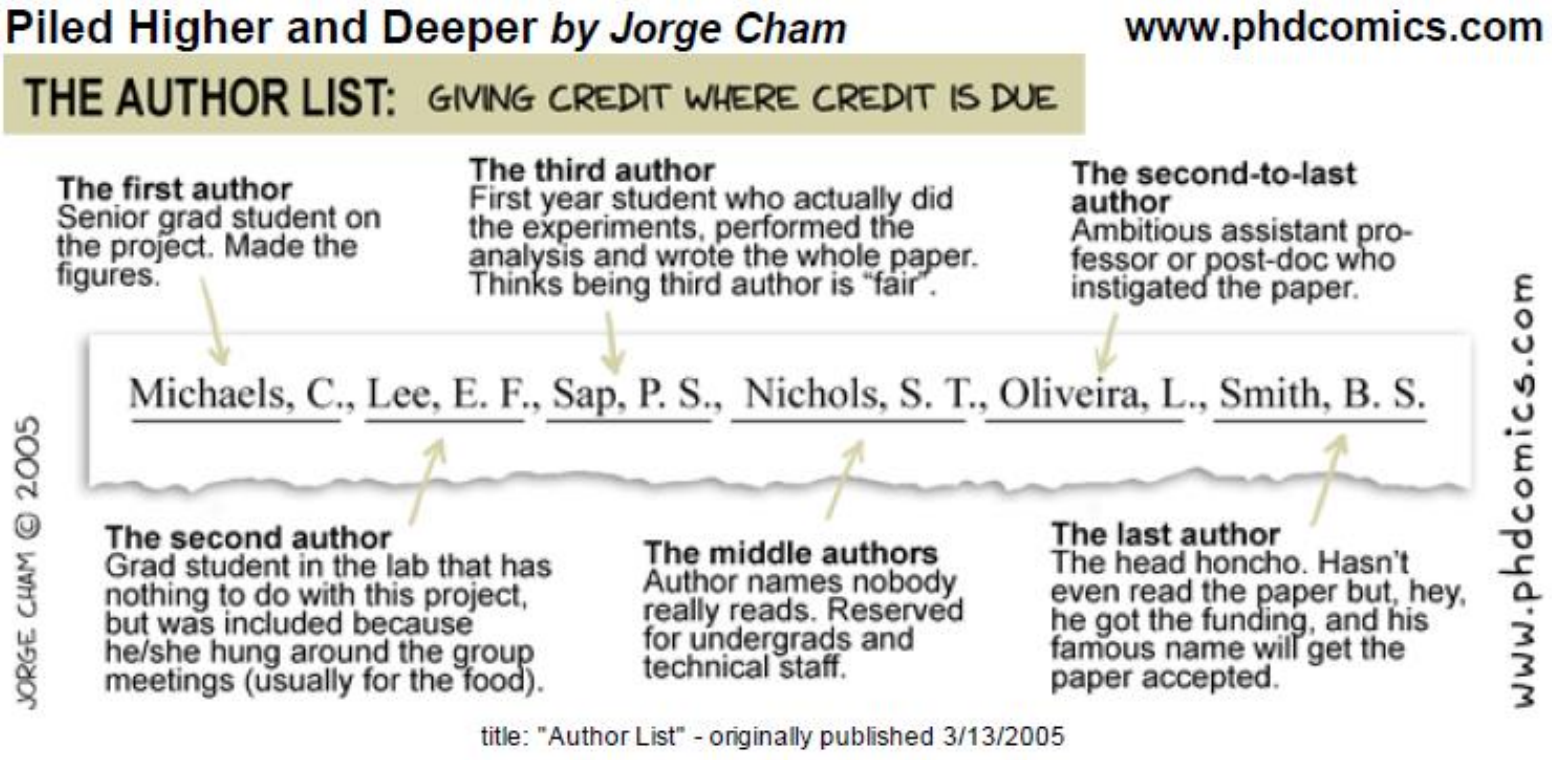
Papers, talks, posters, grant applications, blogs, articles

Writing a Scientific Manuscript



Authorship

- Who is an author?
- In what order?



Authorship

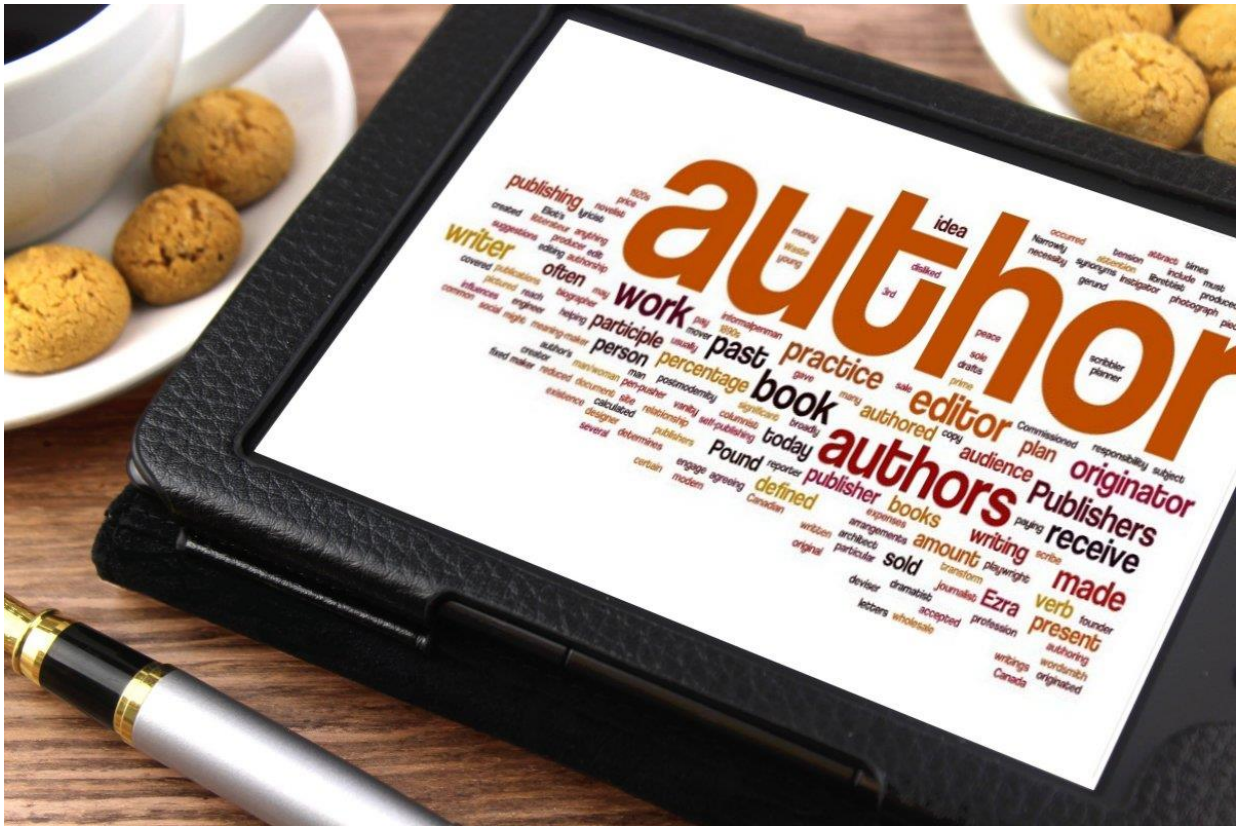
How is authorship decided?

- Substantial contributions to the **conception or design** of the work, or to the **acquisition, analysis or interpretation of data.**
- **Drafted or revised** the work.
- **Approved** the published version.
- **Be accountable** for that version.

International Committee of Medical Journal Editors (ICMJE)

Authorship

- Is the position of authors important? Why?
- How do you decide where to publish?
- Is it important where you publish?



Authorship

Brain Research, 456 (1988) 57–63
Elsevier

BRE 13786

Distribution of GAD-immunoreactive neurons in the first (SI) and second (SII) somatosensory cortex of the monkey

Eric H. Chudler, Stephanie Pretel and Dan R. Kenshalo, Jr.

Neurobiology and Anesthesiology Branch, National Institute of Dental Research, National Institutes of Health, Bethesda, MD 20892 (U.S.A.)

(Accepted 16 February 1988)

Brain Research, 481 (1989) 383–387
Elsevier

BRE 23397

Distribution and size of GABAergic neurons in area 7b and the retroinsular cortex of the monkey

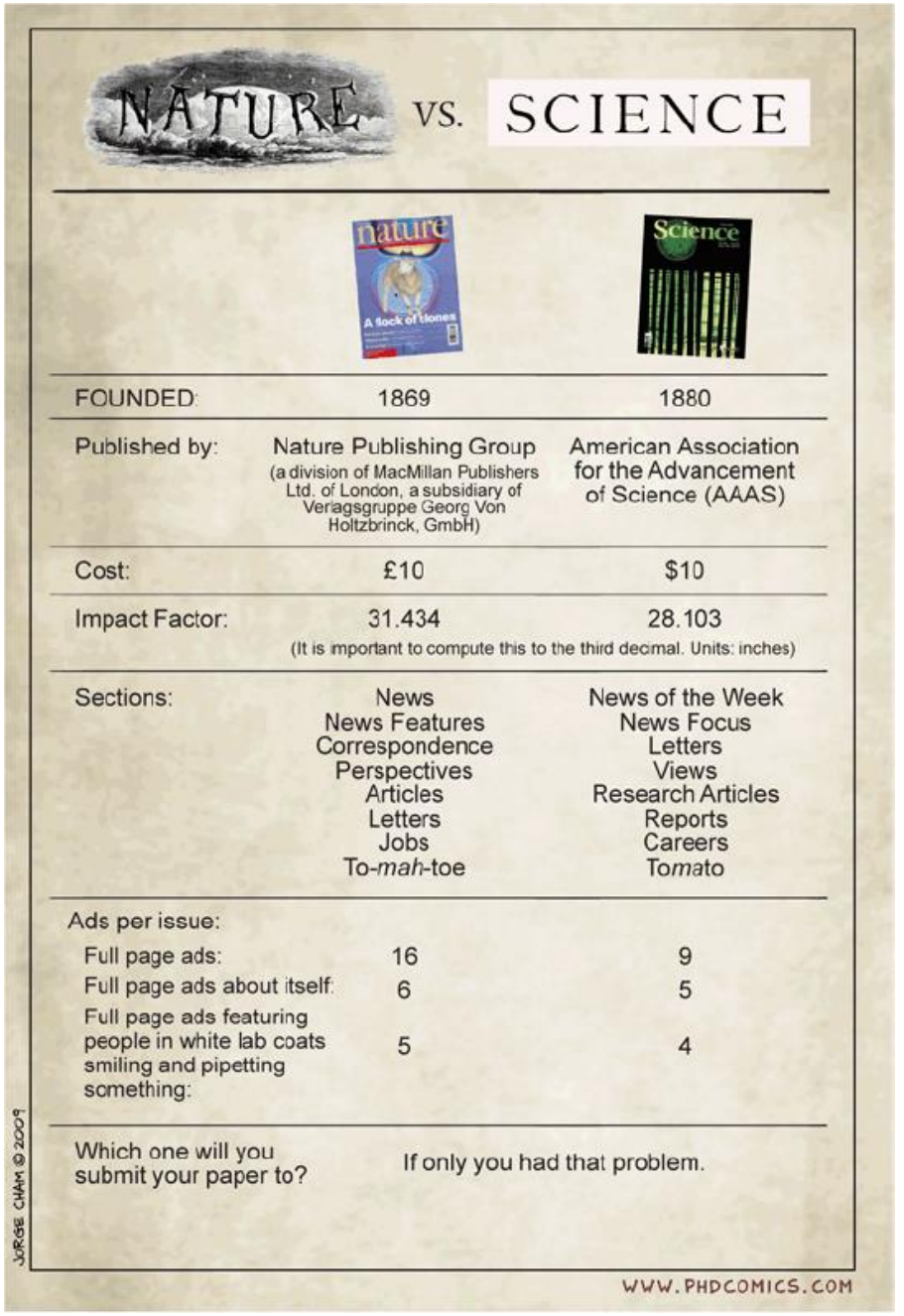
Eric H. Chudler, Richard L. Nahin and Dan R. Kenshalo, Jr.

Neurobiology and Anesthesiology Branch, National Institute of Dental Research, National Institutes of Health, Bethesda, MD 20892 (U.S.A.)

(Accepted 15 November 1988)

Which journal?

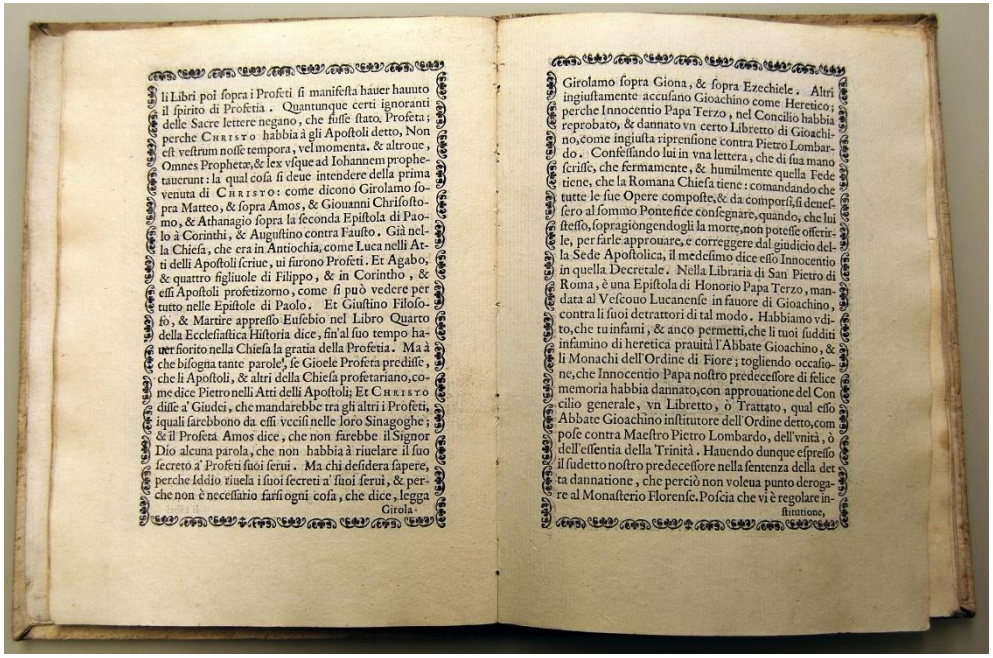
- Audience
- Impact factor
- Cost
- Length
- Time



InCite's Journal Citation Reports
https://jcr.clarivate.com/JCRLandingPageAction.action

Types of Science Papers

- Research Papers
- Review Papers
- Commentaries
- Letters to the editor
- Book/software reviews



li Libri poi sopra i Profeti si manifesta hauer hauuto il spirito di Profetia. Quantunque certi ignoranti delle Sacre lettere negano, che fusse stato Profeta; perche CHRISTO habbia à gli Apostoli detto, Non est vestrum nosse tempora, vel momenta. & altroue, Omnes Prophetæ, & lex vsque ad Iohannem prophetauerunt: la qual cosa si deue intendere della prima venuta di CHRISTO: come dicono Girolamo sopra Matteo, & sopra Amos, & Giouanni Chrisostomo, & Athanagio sopra la seconda Epistola di Paolo à Corinthi, & Augustino contra Fausto. Già nella Chiesa, che era in Antiochia, come Luca nelli Atti delli Apostoli scriue, ui furono Profeti. Et Agabo, & quattro figliuole di Filippo, & in Corintho, & essi Apostoli profetizorno, come si può vedere per tutto nelle Epistole di Paolo. Et Giustino Filosofo, & Martire appresso Eusebio nel Libro Quarto della Ecclesiastica Historia dice, fin'al suo tempo hauer fiorito nella Chiesa la gratia della Profetia. Ma à che bisogna tante parole', se Gioele Profeta predisse, che li Apostoli, & altri della Chiesa profetariano, come dice Pietro nelli Atti delli Apostoli; Et CHRISTO disse a' Giudei, che mandarebbe tra gli altri i Profeti, iquali sarebbono da essi vccisi nelle loro Sinagoghe; & il Profeta Amos dice, che non farebbe il Signor Dio alcuna parola, che non habbia à riuelare il suo secreto a' Profeti suoi serui. Ma chi desidera sapere, perche Iddio riuela i suoi secreti a' suoi serui, & perche non è necessario farsi ogni cosa, che dice, legga

Girola-

Girolamo sopra Giona, & sopra Ezechiele. Altri ingiustamente accusano Gioachino come Heretico; perche Innocentio Papa Terzo, nel Concilio habbia reprobato, & dannato vn certo Libretto di Gioachino, come ingiusta riprensione contra Pietro Lombardo. Confessando lui in vna lettera, che di sua mano scrisse, che fermamente, & humilmente quella Fede tiene, che la Romana Chiesa tiene: comandando che tutte le sue Opere composte, & da comporsi, si denessero al sommo Pontefice consegnare, quando, che lui stesso, sopragiongendogli la morte, non potesse offerirle, per farle approuare, e correggere dal giudicio della Sede Apostolica, il medesimo dice esso Innocentio in quella Decretale. Nella Libraria di San Pietro di Roma, è una Epistola di Honorio Papa Terzo, mandata al Vescouo Lucanense in fauore di Gioachino, contra li suoi detrattori di tal modo. Habbiamo vdito, che tu infami, & anco permetti, che li tuoi sudditi infamino di heretica prauità l'Abbate Gioachino, & li Monachi dell'Ordine di Fiore; togliendo occasione, che Innocentio Papa nostro predecessore di felice memoria habbia dannato, con approuatione del Concilio generale, vn Libretto, o Trattato, qual esso Abbate Gioachino institutore dell'Ordine detto, compose contra Maestro Pietro Lombardo, dell'vnità, ò dell'essentia della Trinità. Hauendo dunque espresso il sudetto nostro predecessore nella sentenza della detta dannatione, che perciò non voleua punto derogare al Monasterio Florense. Poscia che vi è regolare in-

stitutione,

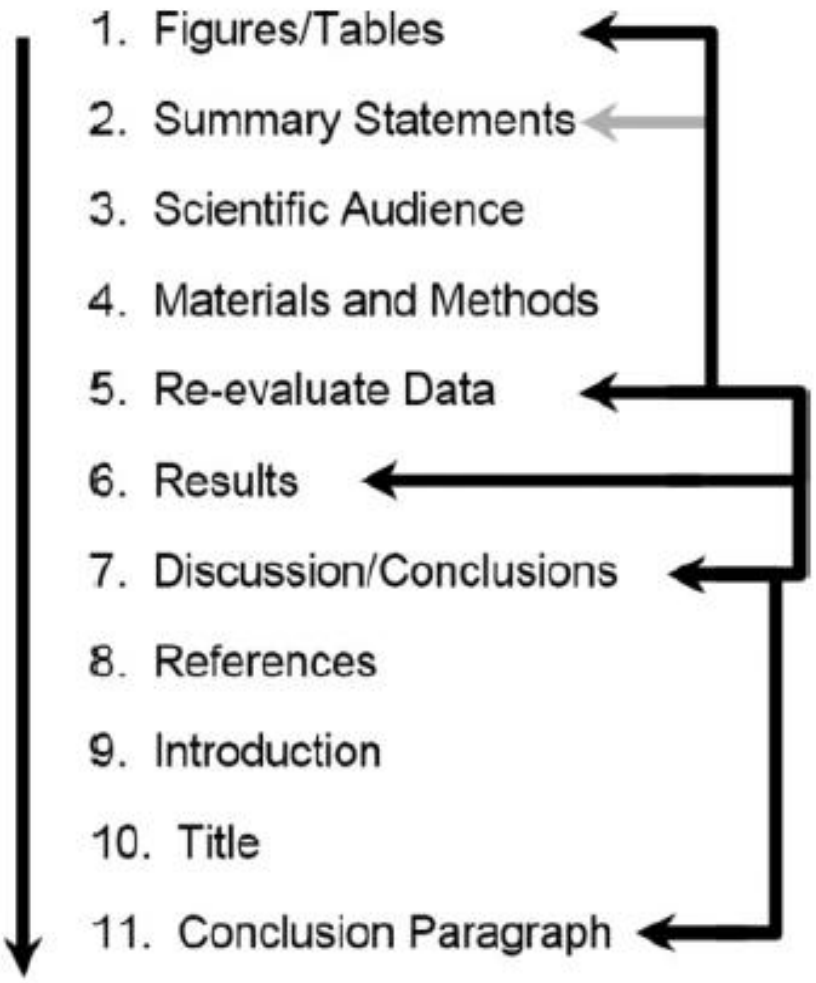
When are you ready to write a paper?

What are the parts of a paper?

- Title
- Authors
- Affiliations
- Abstract
- Introduction
- Methods
- Results
  - Figures
  - Tables
- Discussion
- Acknowledgments
- References
- Supplemental Material

Order of writing

The linear progression of the process.

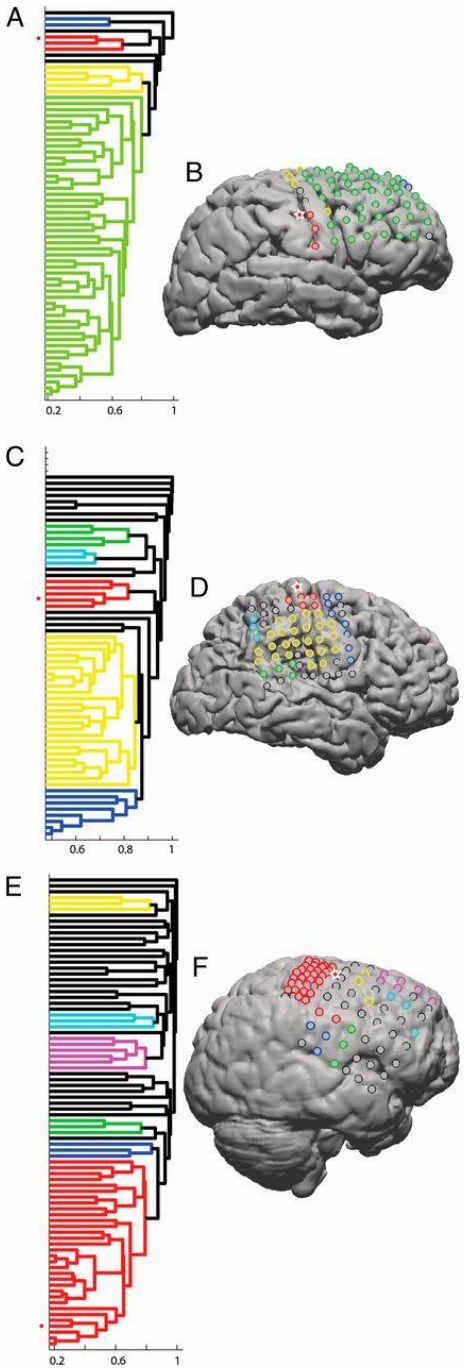


Points where data should be re-evaluated to decide if the data, results, and discussion all point toward the conclusions.

From: O'Connor, T.R. and Holmquist, G.P., Algorithm for writing a scientific manuscript, Biochem Molec. Biol. Educ., 37:344–348, 2009.

Creating Figures (next week)

- Use a vector graphics editor
- All figures need numbers and captions
- Provide all of the information that the reader needs to understand the figure



Language

- 1st person is okay?
- Active voice
  - "the dog bit the postman" vs. "the postman was bitten by the dog"
- Use appropriate jargon
- Don't use words if you don't know what they mean
- Don't use 5 words if you can use 1
- Use periods.
- Forbidden words:
  - Nowadays
  - Whilst
  - Obviously

Results Words (data relation words)	Discussion or Conclusion Words (cause/effect logic and mechanistic words)
Were correlated, were positively correlated	Causes, brings about
A was a function of B; A increased with increasing B	Necessary (strong); mandatory, obligatory, essential
Associated	Necessary and sufficient (very strong)
Accompanied	Influences (weak) (affects)
Interdependent, related, correlated	A brings about a change in B (effects); A influences B
Proportionate, reciprocal, concordant	Consequence, effect, outcome, result
	Elicit, produce, induce, stimulate, consistent with

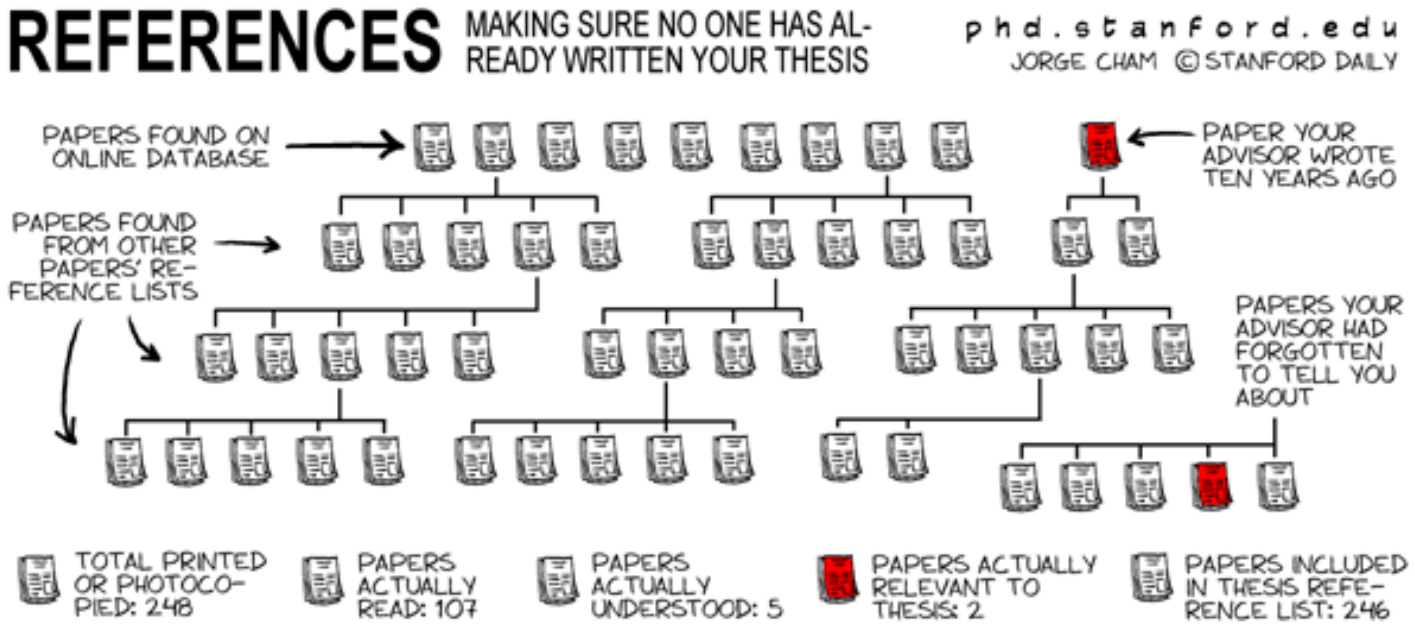
From: O'Connor, T.R. and Holmquist, G.P., Algorithm for writing a scientific manuscript, Biochem Molec. Biol. Educ., 37:344–348, 2009.

Piled Higher and Deeper *by Jorge Cham* **www.phdcomics.com**

title: "Deciphering Academese" - originally published 1/18/2004

Citations

- Reference editor
- Who do you cite?
- How often do you cite?



Reference Managers

To find papers

To cite papers

To save papers

To create a reading list

To create a bibliography

Zotero: http://www.zotero.com ← FREE!

Endnote: https://endnote.com ← Not Free, ~$250

+ about 30 other products

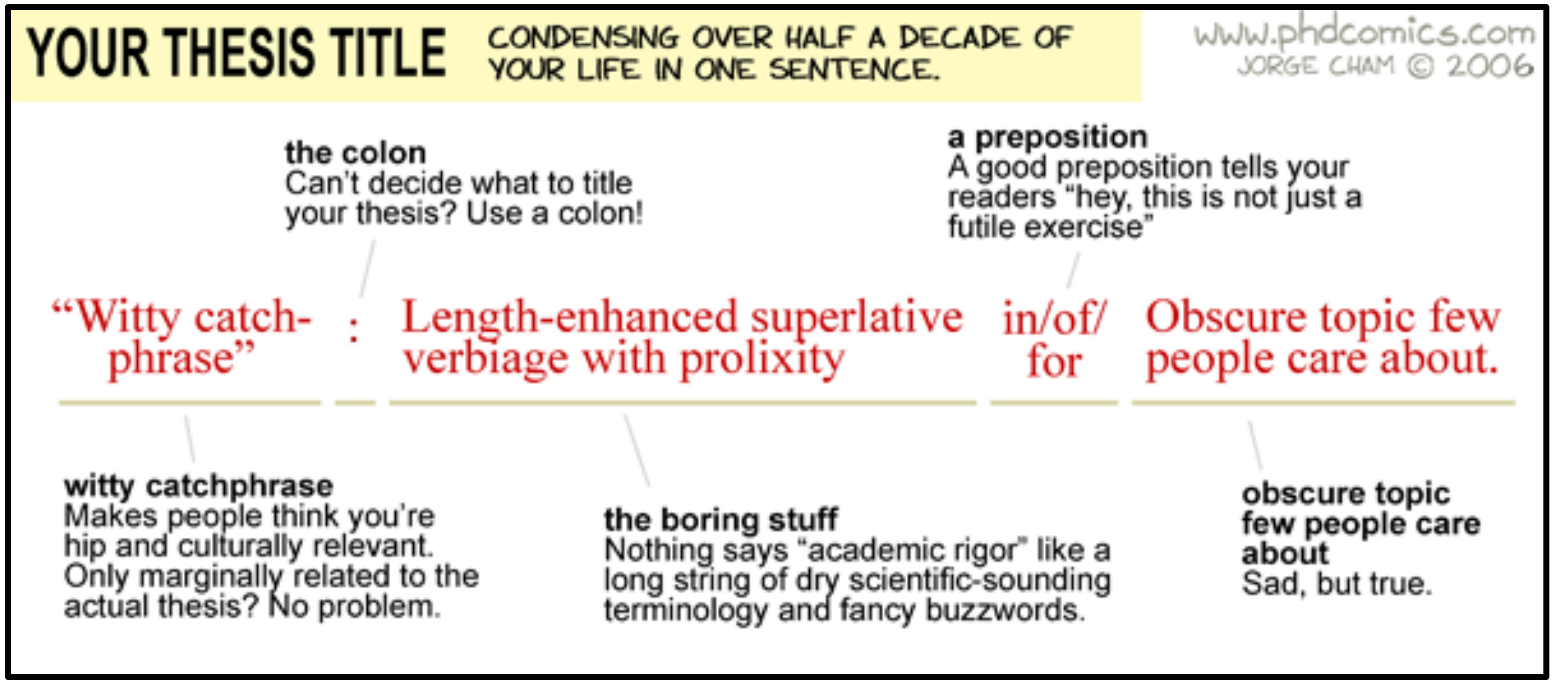
Reference Managers

Zotero

http://www.zotero.com

Title

- Positive statement
- Summarize your results
- Be specific – appeal to the people who care
- Spell things out



Formatting – oh the horror

- Margins
- References
- Spacing
- Font
- Section Titles (order)

Check: Instructions (Guide) for Authors

Different journal have different formats.

Cover letter

- Does anybody read it?

Corresponding Author:
University of Washington
Seattle WA 98105

Dear Senior Editor,

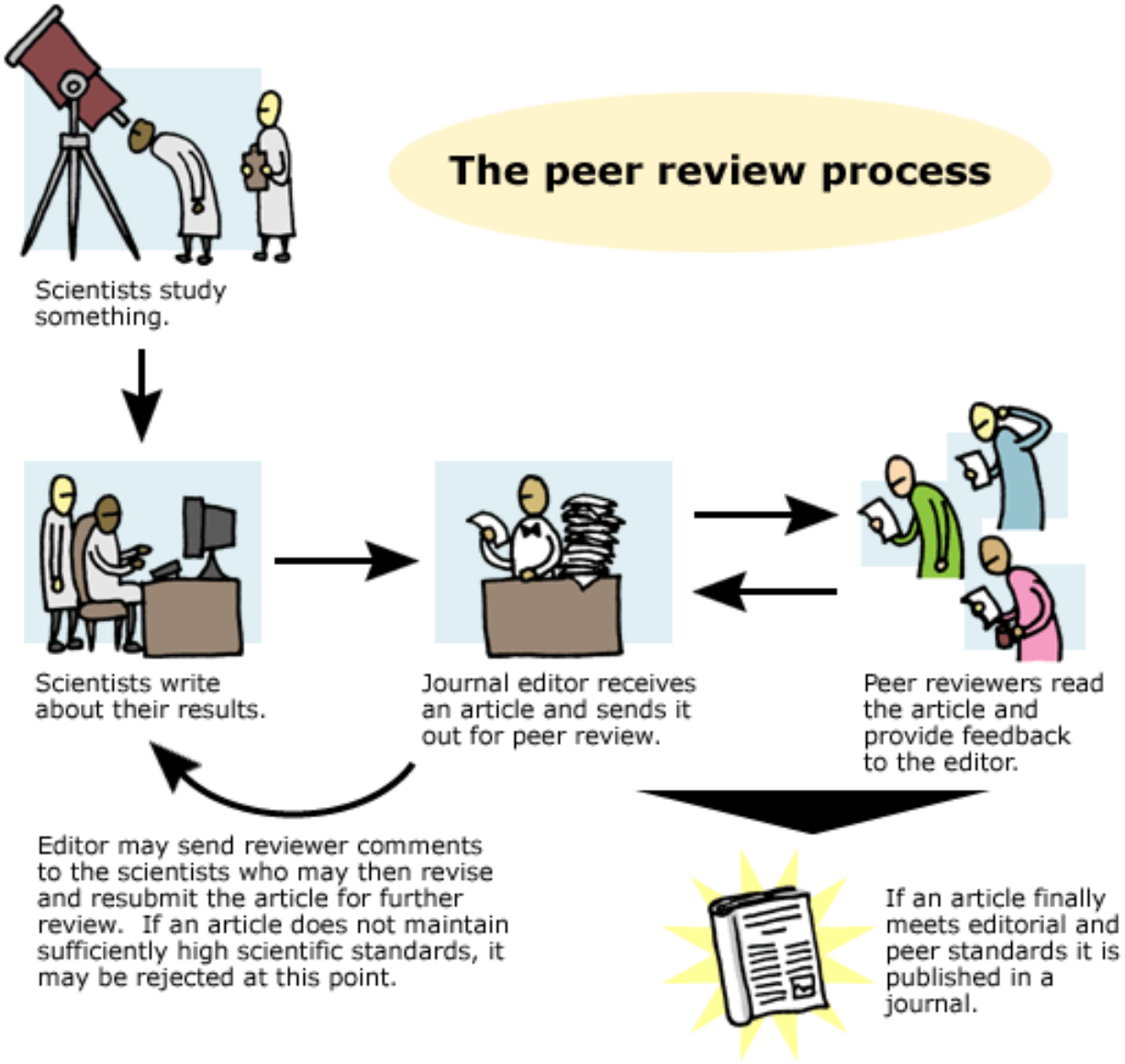
Please find attached our manuscript “Spatiotemporal sleep spindle networks reflect the intrinsic connectivity revealed by waking behavior and resting state fMRI,” submitted to be considered for publication in the *Proceedings of the National Academy of Sciences.* In this study we analyzed sleep recordings from subjects implanted with electrocorticography grids for epilepsy monitoring. Taking advantage of the unique combination of resolution and spatial coverage afforded by this recording modality, coupled with a newly developed tool for analysis of large-scale neural data, we are able to report several novel and interesting results. We confirm the existence of two primary spindle sources and map their distribution across the surface of the cortex. Further, we show that sleep spindles cluster into a small number of networks and that these networks span non-contiguous cortical areas. Finally, we compare spindle networks to behaviorally-driven cortical activation patterns and to resting state fMRI functional connectivity maps. Correspondence between these spatial patterns indicates that sleep spindle networks are constrained by the same underlying functional connectivity as waking behavior and resting state fMRI. These results have important implications for our understanding of spindle-mediated functions such as sleep-memory consolidation as well as for pathologies in which abnormal sleep spindles are observed. More broadly, these results help elucidate the intrinsic connectivity of the brain and establishes a new technique for mapping this connectivity.

Thank you for considering our manuscript.
Sincerely,

XXX, YYY, ZZZ

Peer review

- Who are your "peers"
- Some actual reviews:



http://undsci.berkeley.edu/article/howscienceworks_16

Reviewer #1 :

This paper attempts to determine the strength of sleep replay of behavioral patterns in the prefrontal cortex as a function of distinct brain states such as down-up shifts, K-complexes, spindles etc.

I can neither understand what the key findings are, nor assess the validity of the central claims. It seems that the manuscript is full of unsupported and arbitrary claims. Following is a partial list.

The prefrontal cortex is surrounded by many different brain regions. Show histological data to demonstrate that the tetrodes were in the prefrontal cortex and not some other area in the forebrain, which are not connected to the hippocampus and hence should not be playing any role in sleep replay or consolidation.

The silica tubing (tip diameter 125um) was much wider than the tetrode (tip diameter 25um). The tubing tip had an area of 15625 square um, whereas tetrodes tip had an area of 625 square um. So, the silica damaged 25 times more tissue than the tetrode. The tetrode protruded 1.5mm out of the silica tubing and the tetrodes reached up to 4mm deep inside the brain. So the silica tubing for each of the tetrode went in about 2.5mm through the cortex above the tetrodes, causing 25 times as more damage than the tetrode alone. Isn't this increased damage of concern? What histological procedure was followed to asses the amount of damage caused by the insertion of wide silica tubing?

Since the results depend on unit identification, provide better description and evidence of unit isolation.

Data analysis methods seem rather ad hoc. Five different methods were used to detect different rhythms: 50ms smoothing of spikes for up-down shift detection, 30ms smoothing of spike density for detecting HVS, and filtering of the LFP for detecting K-complexes and LVS in different ranges with certain thresholds. Further, the K-complexes were separated from up-down states by putting an arbitrary cutoff of 10s period between down states and K-complexes.

These methods seem hoc, highly subjective, very parameter sensitive and without clear physiological justification. The authors should use just one or two methods to do all the segregation of data and provide clear physiological and mathematical justification for the procedures and parameters used.

Yet another set of unjustified parameters (50ms smoothing for EV calculations versus 100ms binning for template matching) are used for the explained variance calculations.

The EV calculation methods refer to "R matrix" that is not defined.

The results about sleep replay of spikes are presented in a very abstract fashion. There is not a single spike raster that demonstrate the key results. This is particularly worrisome when the methods used are so ad hoc and parameter sensitive.

Reviewer #2 :

XXX et al. have investigated reactivation during nREM sleep by characterizing ensembles of cell firing in the rat prefrontal cortex. A sleep-wake-sleep paradigm was used - this allows for detecting an increase in correlated neuronal firing during sleep as a consequence of behavior prior to sleep. The key contribution of the paper is identifying during which components of the sleep the reactivation predominantly occur. Reactivation is associated with down-to-up state transitions, K-complexes and low voltage spindles - but not high voltage spindles. This is important basic knowledge providing a better understanding of the functional role of the various sleep components during nREM sleep. The data acquisition and analysis is very well done. The key components of the analysis is based on previously published techniques (e.g. explained variance) and seems very robust. The paper is clear and concise; however, the Result section is a difficult read (see below).

Specific comments
From the Table is appears that the time spend in HVS is very little compared to LVS and KC. How does that speak to the claim that reactivation did not occur during HVS; i.e. was there sufficient data to make the case?

Page 3
Introduction. Please define the frequency ranges for HVS and LVS.

Method section. The criteria for how to automatically identify the different sleep stages are clear. It is however not clear how these criteria relate to automatic detection procedures of other laboratories. How generally accepted are the criteria?

The result section is difficult to read. For instance Fig. 2 is only briefly mentioned. What do we specifically learn from the different panels (e.g. whats the point of the last panel in Fig. 2B?). I propose to better walk the reader through the figures. LVS, HVS and down-to-up transitions could be indicated directly on Fig. 3 and 4.

Page 19. 'Not surprisingly, therefore, these two parameters are correlated with each other.' Down states and K-complexes I assume? Where is this shown?

Figure 7. Why are date for only one rat reported?

I take it is the down-to-up state being of interest. However the abbreviated title refers to only 'down states' - same in Fig 6, Discussion page 20 (line 5 from below).

Reactivation has also been found during REM. Why was REM not characterized?

Table 1. Please list units for the parameters and explain what they mean (e.g. time spent ...).

Spectrograms: color bars with units missing.

Reviewer 1:

In the MS by XXX et al the spatial distribution of spindle activity in subjects with implanted electrocorticography arrays for epilepsy Monitoring was investigated after either training or no-training on a brain-computer interface (BCI). BCI training involved either high-gamma (2 subjects) or beta/mu (1 subject) frequency. These feedback signals were produced by subjects in cortical areas coding for either tongue or hand movements.

The main findings are that the three subjects with BCI training produced on average a significantly higher rate of spindles at the electrode used for BCI control after training as compared to NREM sleep the day before training. The two control subjects did not reveal this pattern.

A second analysis calculated coincidence measures and hierarchical clustering depicted as dendrograms. Here, electrodes revealing increased spindle rate after BCI were largely also part of the same cluster.

The main message of the paper is that BCI training leads to locally increased spindle rate and greater local coincidence in post-NREM sleep as compared to pre-training sleep. An effect not observed in non-BCI training controls. BCI training consisted of positioning a vertically moving cursor within one of several target regions.

There is meanwhile convincing evidence for the local character of sleep spindles (e.g. Nir et al). Also the concept that spindle or slow oscillation activity is locally increased in an activity-dependent fashion is not entirely new. However, most of the latter studies have been conducted using scalp electrodes (e.g. Clemens., Fogel, Huber et al., Bergmann et al) or in animals (Sterman et al 1970). The new elements of the present MS is that BCI can increase local spindle activity, and that this was shown with ECoG recordings.

These are very nice findings. I have however some points to be addressed:

Methods.

1. p. 15 (SI) Why was 1-6 hz used for calculating delta band power when the typical range for scalp recorded EEG is (0.5) 1- 4 Hz?

2. Probably because data from different recording devices/lab groups was used there are some reported inconsistencies: in the SOM high gamma is reported as 70-200 Hz, in the main text as 70-100 Hz. Since (in the SI) the low pass was 134.4 Hz higher frequencies could not be fully assessed.

3. Fig. 1 Subject 1 seems to show enhanced spindle rate also over the frontal cortex (a non-coincident group). The authors should investigate whether there possibly is a consistent temporal relationship on a larger time scale between these two clusters (cp. Mölle et al 2011). May the frontal group reflect activity of the (slower) frontal spindles?

4. For subjects 1 and 2 high gamma activity was used for BCI, whereas for subject 3 only beta/mu activity could be used. Also the BCI control electrode was positioned over the premotor (subjects 1 and 2: primary motor) cortex. One might assume that the strategy of subject 3 was different? Did the relationship of movement vs. imagery for BCI control possibly differ between subject 3 vs. 1 and 2?

5. Please report whether there were any consistent changes in any of the other frequency bands during the BCI task as compared to controls. This may

not be statistically assessable due to the small subject count, but at least in the SI a descriptive account should be given.

6. The discussion following Figure 1 needs streamlining. The authors summarize ?The generalized nature of these results?.? before having given all the results. It os not until farther down that the dendrogram results are described and shown. Also the relevance of the spindle

Findings in regard to the task (?One of the unique aspects of BCI ?.?) should be given before the summary.

Reviewer 1:

This article is an important proof of concept of ECoG electrical stimulation for brain computer interfaces, and translation from animals to humans. The flow is clear, the article is well written and the results are very interesting.

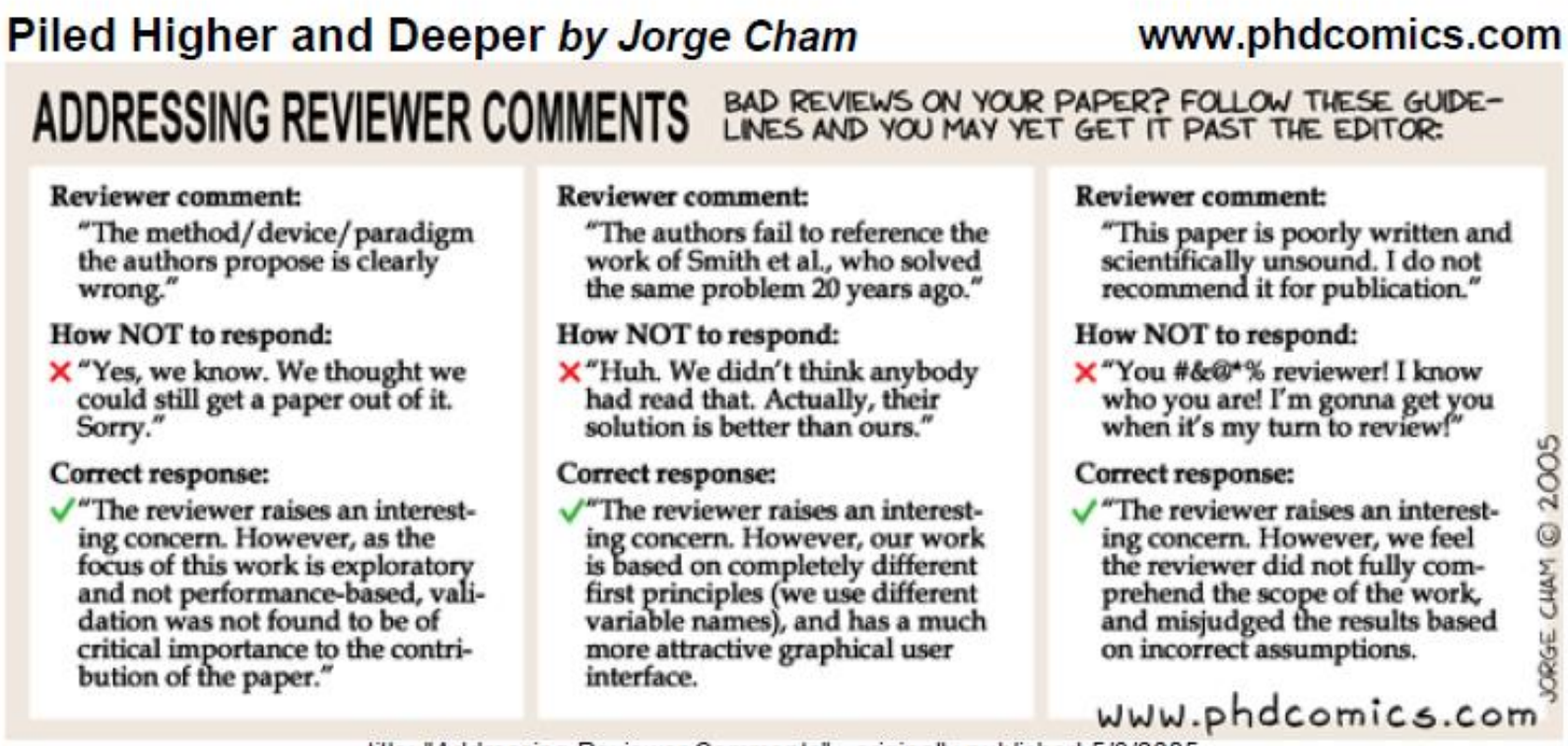
However the IRB limitations prevented longer term experimentation. I am wondering whether one would see long term adaptation to the stimulation if the BCI was to be used on a day to day basis. Since ECoG stimulation is a routine test for somatosensory mapping in those patients, it would be interesting to look into the repeatability when patients have to be mapped several times, or comparing responses of a few trials with the same stimulation parameters. This would still be far from the "continuous" stimulation needed for a BCI, but provide some insight in the adaptation.

Reviewer 2:

In this manuscript, XXX and colleagues use ECoG arrays, implanted in Human subjects over sensorimotor cortex for clinical purposes, to address whether various electrical stimulation parameters are discriminable (they are) and to inquire about the qualitative nature of the evoked percepts as parameters were varied (the subjects reported variations in intensity). These are important results which act as a critical confirmation of and elaboration on classic findings in humans and animals. I am generally happy with the manuscript as is, but I have some comments and concerns.

Revisions

- Be nice
- Do what you can, defend what you can't
- Respond to everything



title: "Addressing Reviewer Comments" - originally published 5/3/2005

Dear Senior Editor,

Please find attached our revised manuscript “Spatiotemporal sleep spindle networks reflect the intrinsic connectivity revealed by waking behavior and resting state fMRI.” The authors wish to thank the reviewers for their careful reading and thoughtful criticism of the manuscript. We have taken their suggestions under consideration and believe the manuscript is improved as a result. In response to the comments we received we have significantly revised the text, included a new Supplementary Methods section, and created several new Supplementary Figures. In particular, we have made substantial efforts to clarify the methods and quantify the results. Please note that in order to accommodate the new text we have reworked figures 1 and 4 to include only example data from one subject. The full data for all subjects has been moved to the supplementary information.

We believe that these changes address the concerns raised by the reviewers and greatly improve the overall quality of our submission. Below we have provided point-by-point responses to the reviewer comments.

Thank you for considering our manuscript.

Sincerely,

XXX, YYY, ZZZ

Reviewer #1:

Comments:

This is a well-written study with appropriate introduction and discussion. The questions addressed by this study are important and the method is original. The results are, at first glance, important and fit well with an emerging picture of spindles as distinct entities engaging different cortico-thalamic systems. However, essential elements of the methods are not disclosed, and the results are descriptive.

Methods

1. An automated method for grouping spindles would be quite useful but the actual process and results of the DMD method are unclear.

Response: We have now included more details about the DMD method both in the Methods section as well as in a new Supplementary Methods section. We have also included a supplementary figure outlining the method as a block diagram.

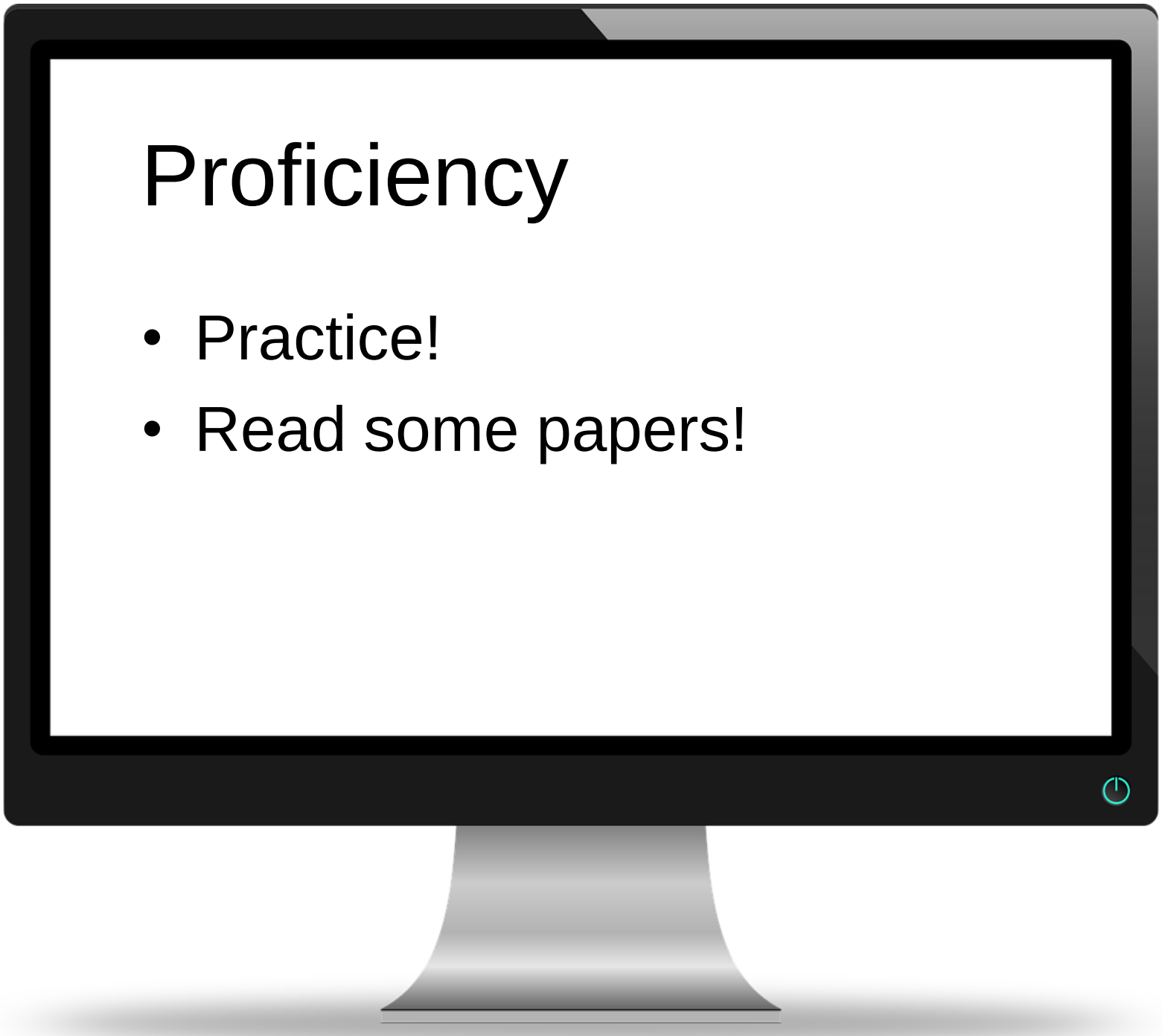
2. The Archiv paper states that the DMD method is actually applied to an augmented matrix (the original matrix augmented with additional time-shifted replicas of the data). Was that the case in the current study and if so how many replicas were used in the augmented matrix?

Response: Yes, the DMD method is applied an augmented matrix. We chose the number of stacks to be the smallest integer h so that $hn > 2m$ where n is the number of channels and m is the number of data points in the window. This stacking provided enough DMD modes to capture the observed dynamics. This information can be found in the Methods section of the manuscript.

3. As far as I can tell, there is nothing in the method per se that focusses on different frequencies; rather this emerges implicitly as a result of the operator relating the data matrix to its replica shifted one delta t into the past. Is this correct? If so, were modes found that were not related to spindle frequencies? What proportion of the accepted modes (i.e., accepted into the most explanatory group) were associated with spindles and what proportion were associated with other phenomena such as K-complexes, interictal spikes, or artifacts?

Response: No, it is not correct that nothing in the method focuses on different frequencies. Modes are selected based on their frequency, which must be in the subject-specific spindle band. Modes are extracted at many different frequencies; these modes form the basis of the DMD power spectrum for each window. Presumably some modes are related to K-complexes, interictal spikes and artifacts but these modes should not form a significant portion of the accepted modes because they are either in a different frequency range (K-complexes), span the entire spectrum (artifacts) or are not periodic at the spindle frequency (interictal spikes) and therefore rejected by the autocorrelation constraint. We believe that the inclusion of a schematic diagram of our detection method (figure S16) makes these points clear to the reader.

Etc.


Proficiency
• Practice!
• Read some papers!