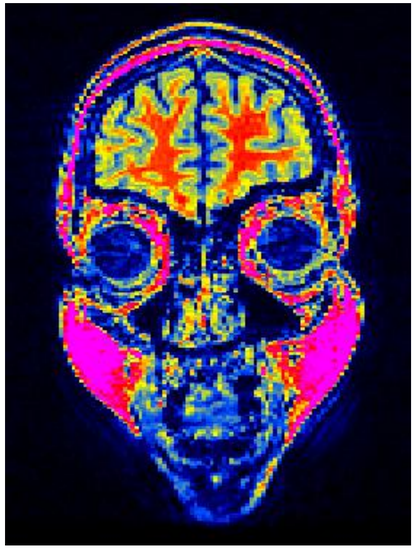
Polytechnique Montreal
August 20th, 2019, Montreal, Canada

The scientist as a journalist: A case study



Atef Badji

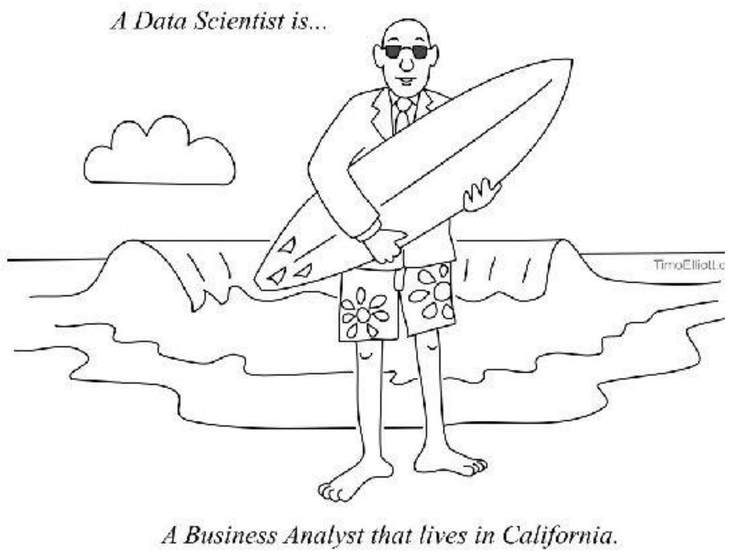
Outline

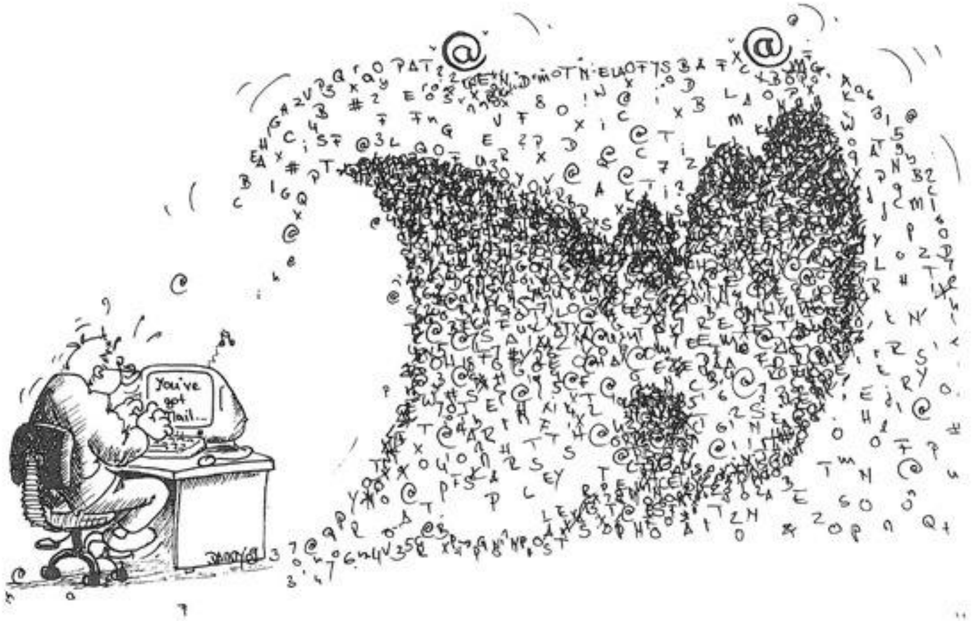
1. Motivation
2. Highlights version 1.0
3. Highlights version 2.0

Outline

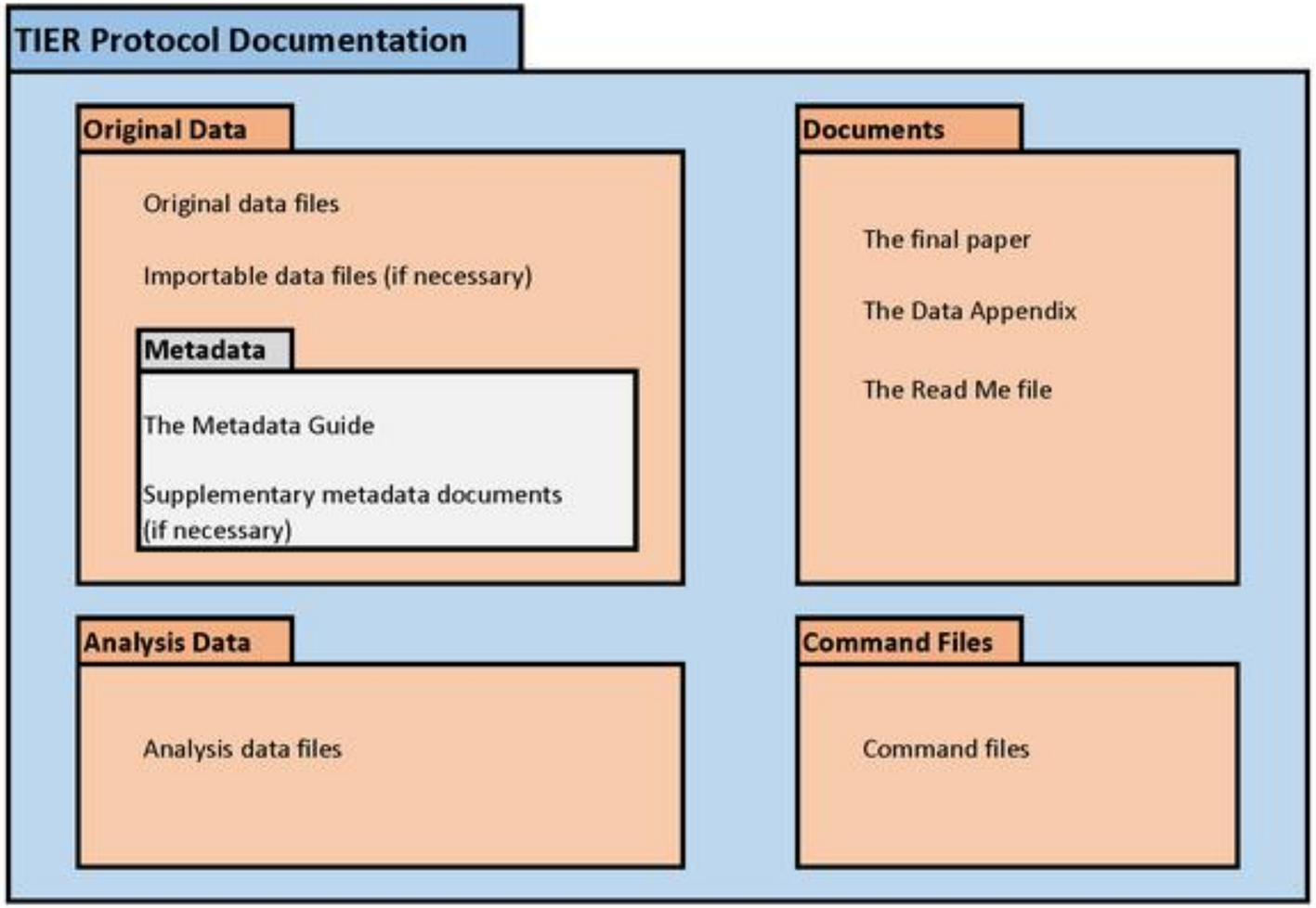
1. Motivation
2. Highlights version 1.0
3. Highlights version 2.0

Professor Smith





With thanks to Chris Gorgolewski and Elizabeth Dupré



The TIER Specification

Meet Nina

Credit: graphicbee

Credit: Robert Neubecker

Why scientists make it so hard to read their paper ?

Unit 2: Writing Scientific Papers

As a scientist, you are expected to share your research work with others in various forms. Probably the most demanding of these forms is the paper published in a scientific journal. Such papers have high standards of quality, and they are formally disseminated and archived. Therefore, they constitute valuable, lasting references for other scientists — and for you, too. In fact, the number of papers you publish and their importance (as suggested by their impact factor) are often viewed as a reflection of your scientific achievements. Writing high-quality scientific papers takes time, but it is time well invested.

As you may have noticed, however, many scientific papers fail to usefully communicate research work to their audience. They focus on the authors instead of on the readers by failing to clarify the motivation for the work or by including unnecessary details. Or they try to impress the readers rather than inform them. As a result, they are interesting to or understandable by only a small set of highly specialized readers. Effective scientific papers, in contrast, are interesting and useful to many readers, including newcomers to the field.

This unit will help you write better scientific papers in English. In particular, it will help you select and organize your content, draft your paper, and revise your writing so that your final paper is useful to a broad audience — not just a few specialists.

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Research: The readability of scientific texts is decreasing over time

Pontus Plavén-Sigray, Granville James Matheson, Björn Christian Schiffler, William Hedley Thompson
Karolinska Institutet, Sweden

FEATURE ARTICLE Sep 5, 2017

CITED 1 VIEWS 17,588 COMMENTS 5

CITE AS: eLife 2017;6:e27725 DOI: 10.7554/eLife.27725

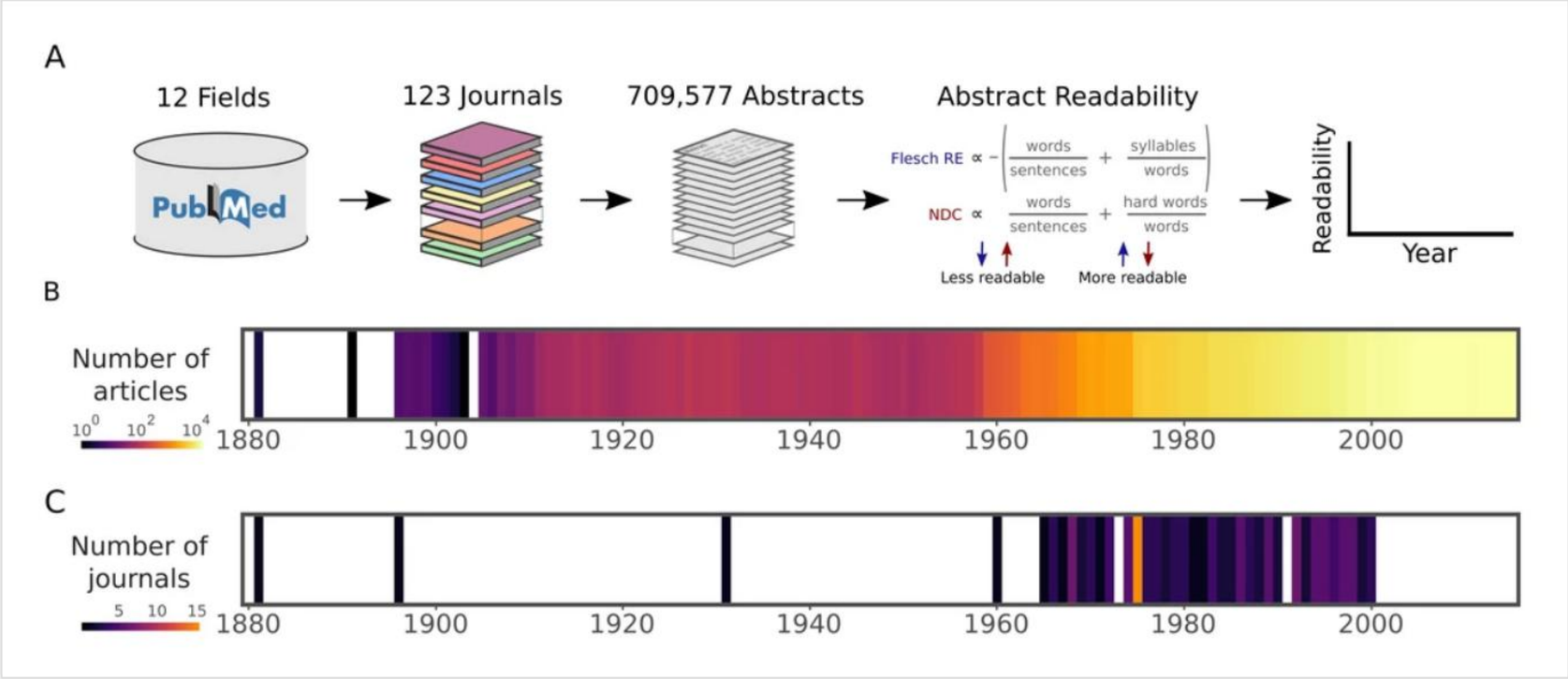
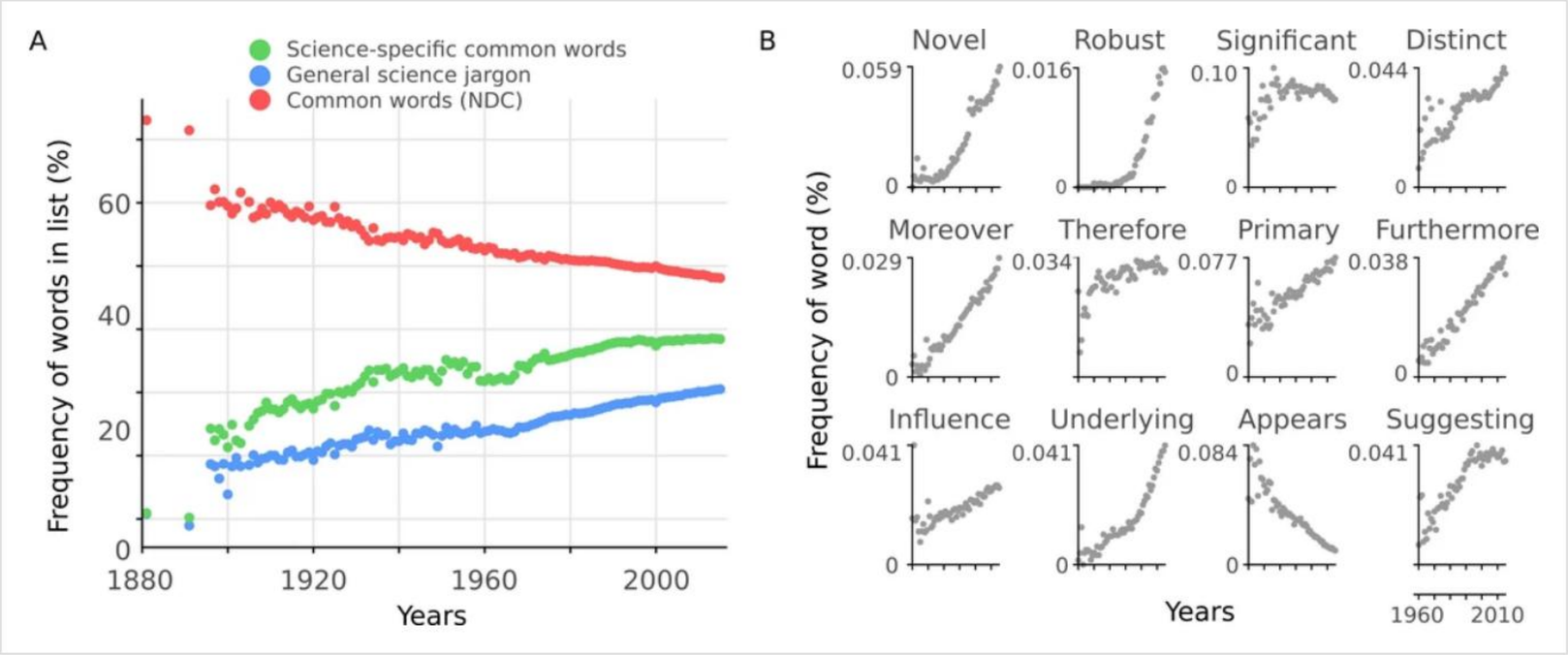
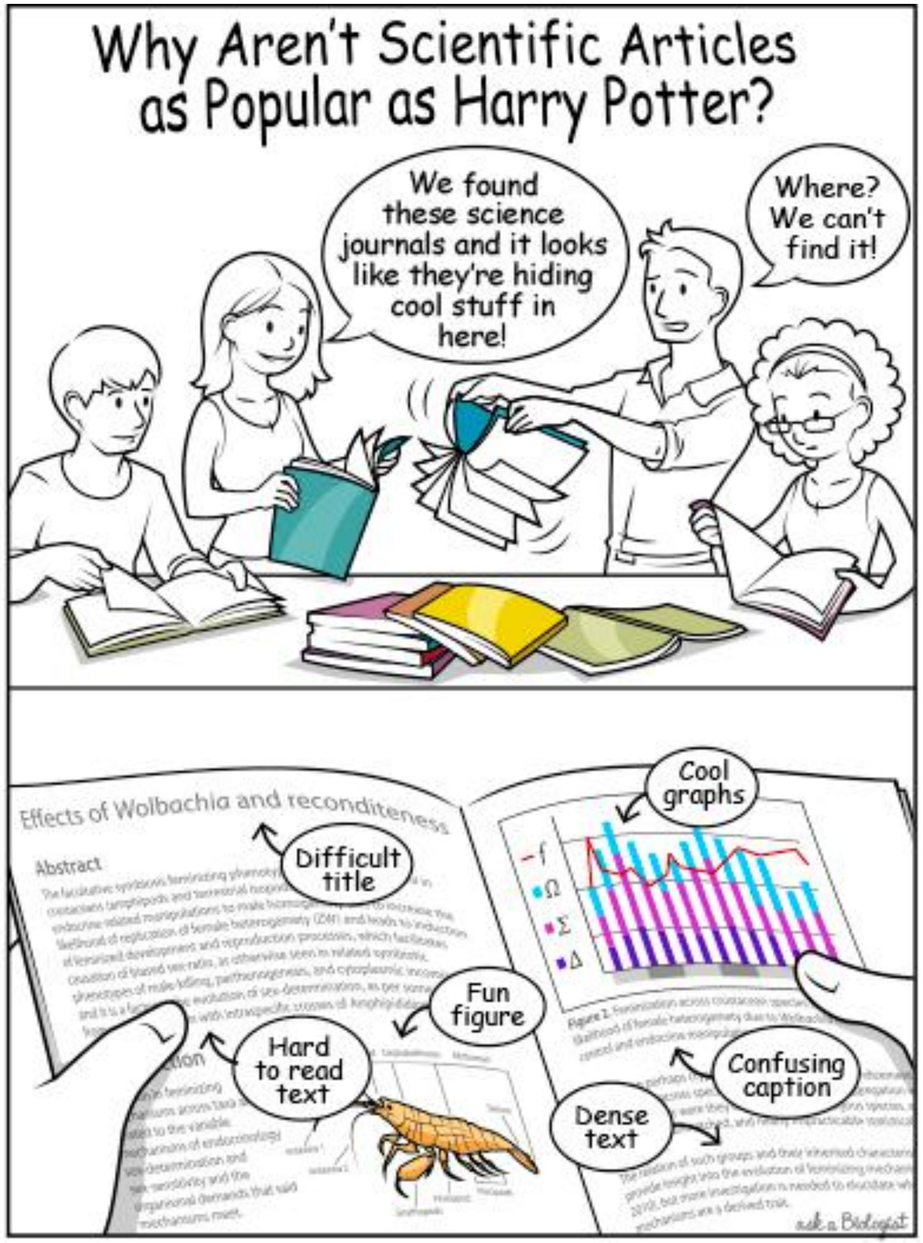


Figure 6



Readability is affected by general scientific jargon.

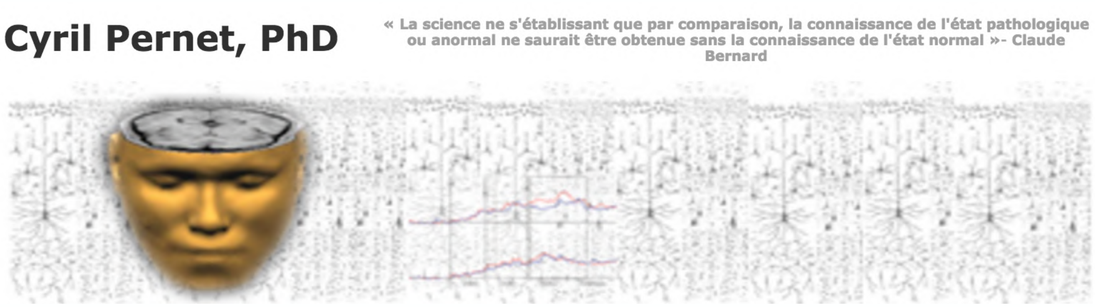
(**A**) Mean percentage of words in abstracts per year included in three different lists: science-specific common words (green, 2,949 words), general scientific jargon (blue, 2,138 words) and NDC common words (red, 2,949 words). (**B**) Example general science jargon words taken from the general scientific jargon list. Mean percentage of each word's frequency in abstracts per year is shown.



Credit: ask a Biologist

If only there were a place where I can understand the key points of a paper without wanting to sleep after 5 min …

Blogs



Terra Incognita

by Christian S. Perone

What if such initiative was supported by a whole society ?

History, Mission & Inclusivity

History

On January 1, 1994, the Society of Magnetic Resonance in Medicine and the Society of Magnetic Resonance Imaging merged to form the Society of Magnetic Resonance (now named the International Society for Magnetic Resonance in Medicine). The first annual meeting of the merged Society was held in Dallas, Texas, USA, in March 1994. The most recent annual meeting was held in Montréal, QC, Canada, 11-16 May 2019.

The merged International Society for Magnetic Resonance in Medicine is an international, nonprofit, scientific association whose purpose is to promote communication, research, development, and applications in the field of magnetic resonance in medicine and biology and other related topics and to develop and provide channels and facilities for continuing education in the field. Its multidisciplinary membership of over 8,000 consists of clinicians, physicists, engineers, biochemists, and technologists.

In addition to its large scientific meetings, the Society holds workshops and publishes two journals, Magnetic Resonance in Medicine and the Journal of Magnetic Resonance Imaging. It also sponsors study groups on specific areas of scientific interest and chapters based on geographical location.

Outline

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2. Highlights version 1.0
3. Highlights version 2.0

Magnetic Resonance in Medicine Highlights

Matt Bernstein
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Highlights Editor

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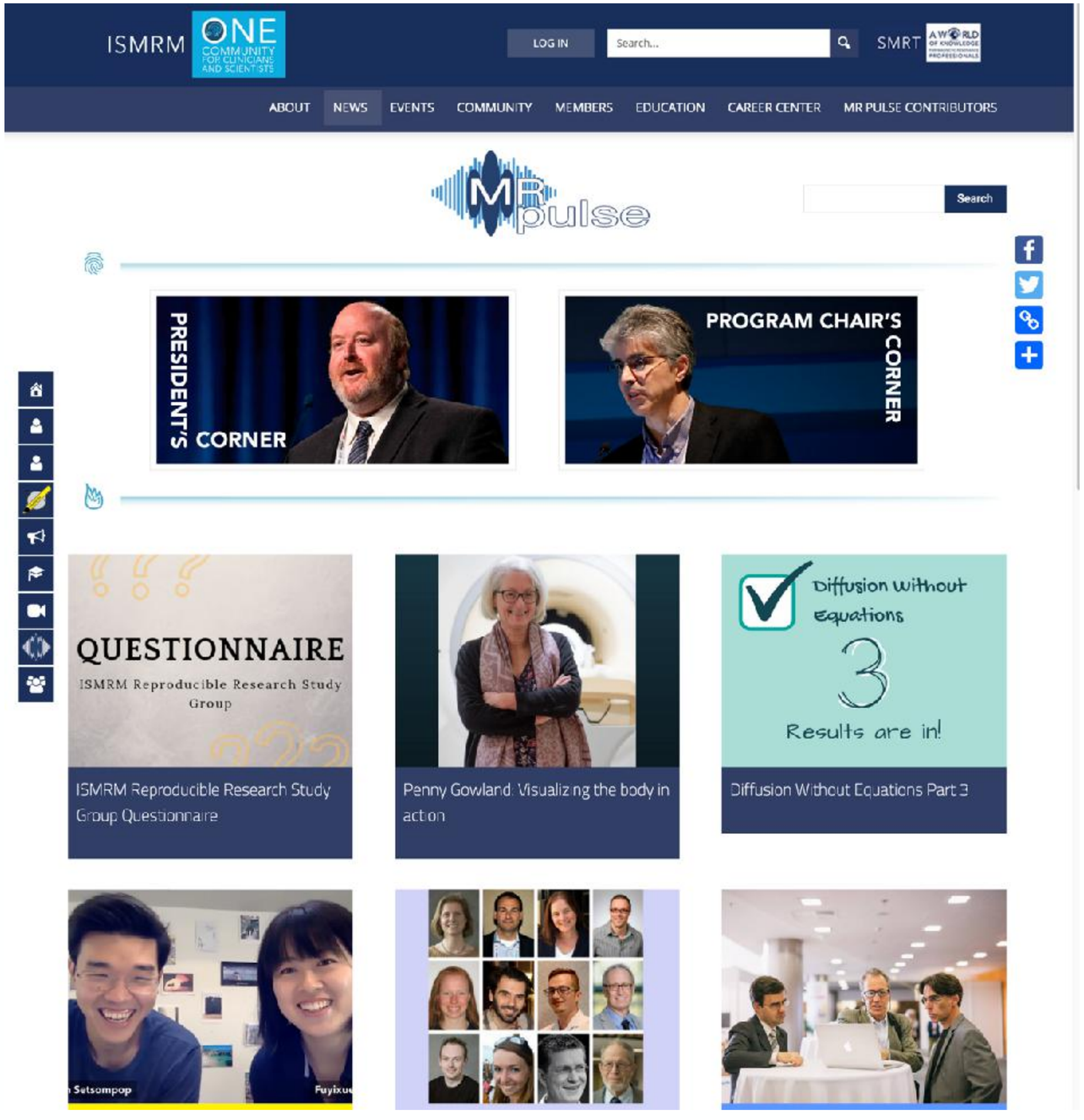
Acknowledgements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QUESTIONNAIRE
ISMRM Reproducible Research Study Group
ISMRM Reproducible Research Study Group Questionnaire
Penny Gowland: Visualizing the body in action
Diffusion without Equations
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Results are in!
Diffusion Without Equations Part 3

Magnetic Resonance in Medicine
Highlights
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Atef Badji November 30, 2018

Q&A with Kerstin Hammernik and Florian Knoll

June 22, 2018

2855 0

Like

Learning a Variational Network for Reconstruction of Accelerated MRI Data

Kerstin Hammernik,[1*] Teresa Klatzer,[1] Erich Kobler,[1] Michael P. Recht,[2,3] Daniel K. Sodickson,[2,3] Thomas Pock,[1,4] and Florian Knoll[2,3]

By Mathieu Boudreau

Kerstin Hammernik with co-authors Erich Kobler and Teresa Klatzer (from left to right) © Lunghammer – TU Graz

This first June 2018 Editor's Pick features Kerstin Hammernik and Florian Knoll, researchers at Graz University of Technology in Austria and New York University School of Medicine (NYU), respectively. Their paper presents a novel approach to MR image reconstruction in which a generalized compressed sensing framework, formulated as a variational model, is combined with deep learning. Tested on a musculoskeletal disease patient population, their reconstructions preserved the natural appearance of MR images and worked well with pathologies that were not included in the training dataset. We met them to find out more about this project and the people behind it.

MRMH: First of all, could you fill us in on your backgrounds?

Kerstin: I did my Bachelor's and Master's degrees in Biomedical Engineering. For my Master's, I focused on image processing, specifically 3D registration and segmentation of dental data and vertebrae using CT images. I'm currently doing a PhD in Computer Science which is supervised by Prof. Thomas Pock. It wasn't until after I started my PhD that I began working with Florian, in the field of medical image reconstruction.

Florian: I actually come from Graz, where Kerstin is currently doing her PhD and I did my Master's and PhD there as well. I became interested in machine learning, the focus of my Master's, some time ago, before it became the hot topic it is today. I then did my PhD in MR imaging. After that, about five years ago, I moved to NYU, where I'm mainly responsible for the development of new methods in data acquisition and reconstruction, and their translation into clinical practice.

MRMH: Could you give us a brief overview of your paper?

Kerstin: The main idea was to come up with a generalized compressed sensing framework, formulated as a variational model. Our reconstruction model has a data term, which allows us to fit the collected k-space data and transform the image with an operator into k-space, and also a regularization term, which imposes prior knowledge on the image. We then combined the variational models with deep learning to learn the parameters of the regularization term and data term in an unrolled gradient scheme, and applied this combination to reconstruct accelerated MRI data. We did experiments on clinical knee data, and looked at how the network performed for different contrasts, orientations and SNRs. We also performed a reader study to evaluate the difference between the compressed sensing methods we tested and our deep learning approach.

Florian: It perhaps helps to understand what first prompted us to do this work. When talking with clinical radiologists, we always encountered resistance when presenting them with images using our compressed sensing reconstructions: they would complain that the images looked a little unnatural and say they weren't confident making a diagnosis based on them. We discovered, over the course of this research, that handcrafted models (like total variation) overly simplify the image content, resulting in this unnatural cartoonish appearance. Our approach allows us to use much more complex image models that can describe the character of our images better. When the method we presented in this work is used as a regularizer, it results in images that are more acceptable to the human eye.

Daniel Sodickson, Kerstin Hammernik, Florian Knoll and Michael Recht (from left to right) at the 2018 Join annual meeting of ISMRM-ESMRMB in Paris

MRMH: Were you surprised by any of the results of this study?

Kerstin: When things work, you're always surprised! [laughs]

MRMH: Where would you like to see this work going from here?

Kerstin: It would be very interesting to establish whether this really is a feasible method for clinical exams – whether it could be applied to a clinical workflow.

Florian: Clinical validation is obviously really important. There are a lot of unanswered questions, and people are always skeptical when they hear the words machine learning. We need to show, in a reasonably sized patient population, that we can produce images that have complete diagnostic value.

MRMH: Are there any other particularly exciting aspects you'd like to highlight?

Kerstin: This method is a tool of exploration and discovery that may be applied to what we already know from compressed sensing. We have shown with our filter kernels and learned functions that we actually get filters and functions that have already been studied and reported in the literature. The next step is to look at whether the number of parameters can be reduced by imposing some structure on the models, and if so how this can be done. This is an important research direction for me.

Florian: At the moment, we are still considering image reconstruction as a step that is isolated from the data acquisition and the diagnostic pipeline. But later on, once we have established that images can be reconstructed in this way, we can look at whether it is possible to go back and change the way we acquire the data, and whether this can help to improve the diagnostic interpretation of the images and the post-processing as well. Furthermore, with the substantial improvements that are constantly being made in computing power and data science, could some of the traditional constraints on our imaging hardware be relaxed by incorporating novel calibration and correction procedures in the reconstruction procedure? All these are certainly exciting questions and ambitious objectives.

MRMH: What do you enjoy doing when you're off duty?

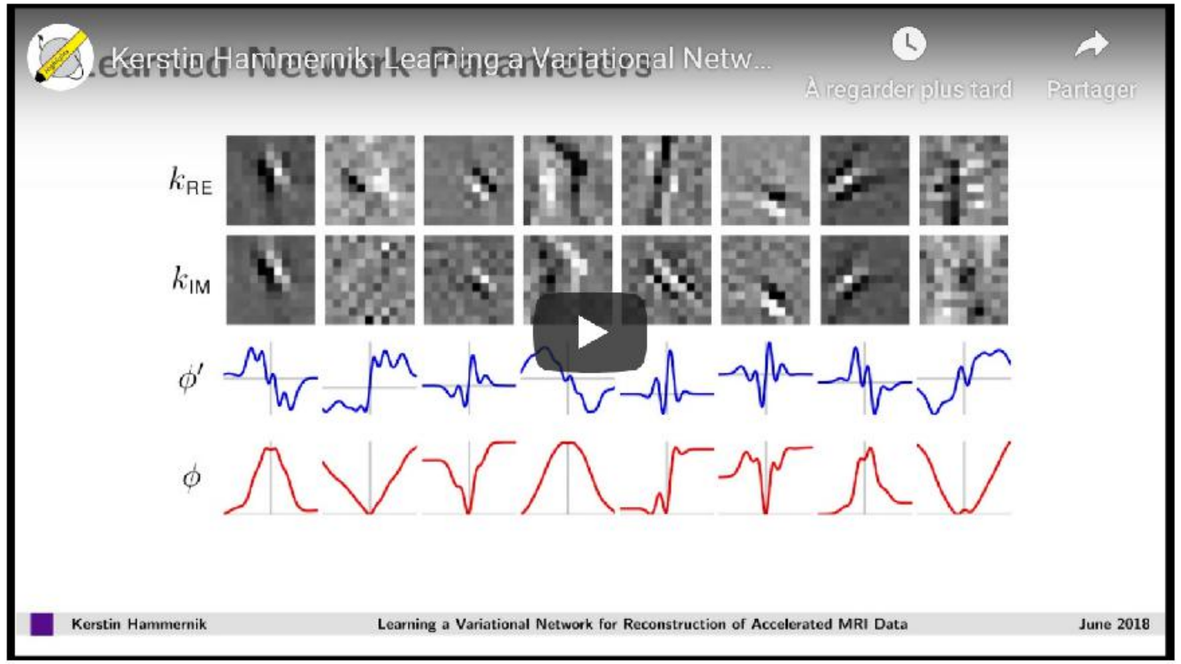
Kerstin: It's important for me to really switch off and relax in my spare time. I love dancing – styles like salsa, bachata, kizomba and zouk. I also love to be outdoors in the mountains and do ski touring, hiking or mountain biking.

Florian: I mainly do sports stuff too – marathons, and martial arts.

MRMH: Have you run in any of the major marathons?

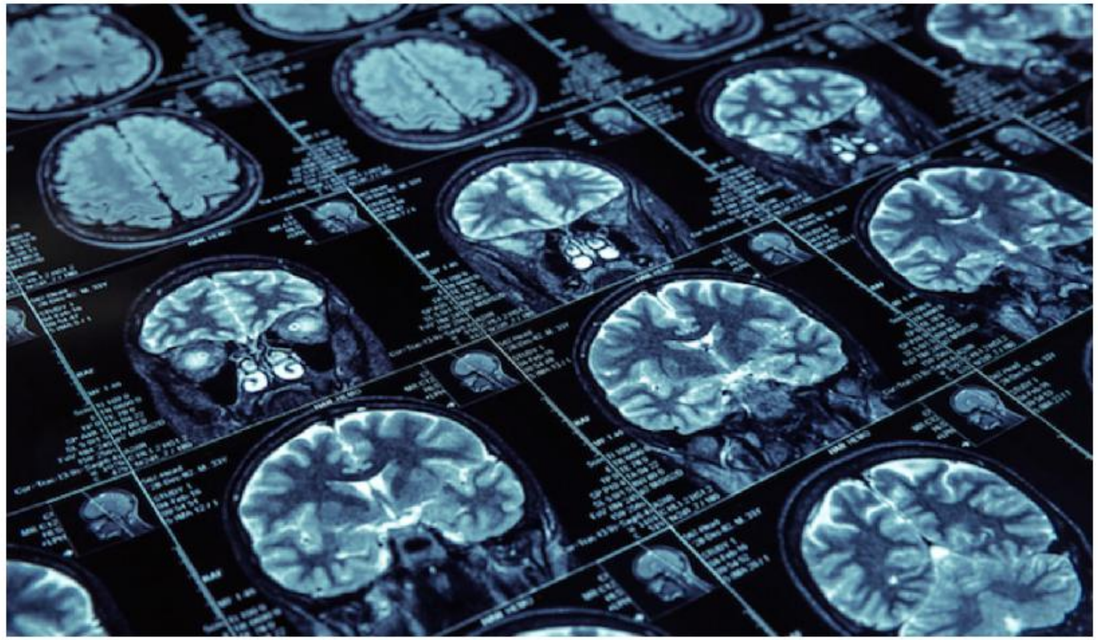
Florian: Of the big city marathons, I ran New York and Chicago. For my next challenge I am considering doing a trail race. That would make an interesting change!

Code and sample data from this work is available on GitHub: https://github.com/VLOGroup/mri-variationalnetwork



Facebook, NYU Will Use Artificial Intelligence for Faster MRIs

Facebook and NYU School of Medicine will partner to speed up MRI scans using artificial intelligence.



Source: Thinkstock

By Jessica Kent

August 21, 2018 - Facebook and NYU School of Medicine's Department of Radiology have **announced** a new collaborative research project that will study the use of artificial intelligence (AI) to make MRI scans up to 10 times faster to complete.

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By ZDNet
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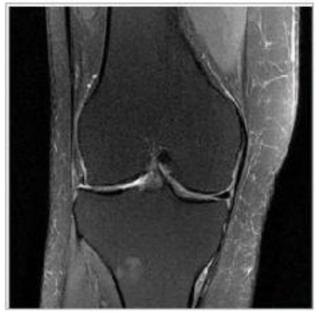

Facebook's artificial intelligence laboratory, working with the New York University School of Medicine, generated reliable magnetic resonance imaging scans faster with less data.

Credit: Facebook

Facebook's artificial intelligence (AI) laboratory, working with the New York University (NYU) School of Medicine, generated reliable magnetic resonance imaging (MRI) scans with less data.

Using a dataset of 10,000 MRI exams from NYU, Facebook trained an algorithm via deep learning to identify the composition of the human body, feeding this knowledge into an MRI scanner's software so the AI can generate a portion of the image, saving time.

NYU School of Medicine researchers say as fastMRI moves forward, they will open-source the image dataset and Facebook will share AI models, baselines, and evaluation metrics.

The researchers' ultimate goal is to boost the speed of scans 10-fold via machine learning, and eventually to expand to other medical imaging areas.

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Test-Retest Reproducibility of Neurochemical Profiles with Short-Echo, Single-Voxel MR Spectroscopy at 3T and 7T

Melissa Terpstra,[1] Ian Cheong,[1] Tianmeng Lyu,[2] Dinesh K. Deelchand,[1] Uzay E. Emir,[1†] Petr Bednařík,[1,3,4] Lynn E. Eberly,[2] and Gülin Öz[1*]

Magnetic Resonance in Medicine Highlights

BY ADAM ELKHALED

In this edition of Highlights Q&A, we were treated to a virtual interview with Dr. Melissa Terpstra and Dr. Gülin Öz, whose work at the University of Minnesota Center for Magnetic Resonance Research (CMRR) has provided unique insight into the reproducibility of spectroscopic data. Our conversation revolved around their investigative efforts to understand how field strength influences consistent neurochemical quantification. By comparing short-echo semi-LASER data from 3T and 7T acquisitions, they managed to arrive at some interesting conclusions that bear direct relevance to other studies, and also underscore the necessity of quality assurance for purposes of clinical translation.

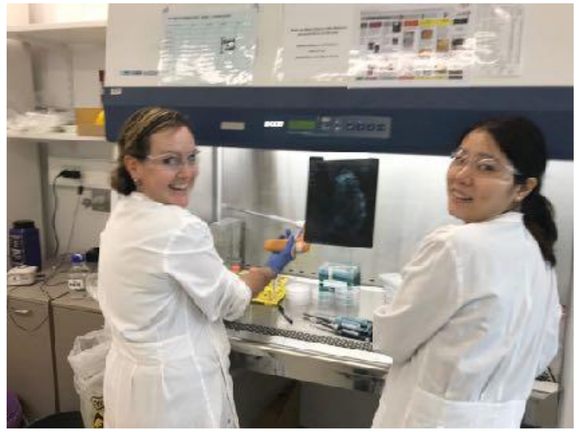
MRMH: How did you become interested in MR spectroscopy?

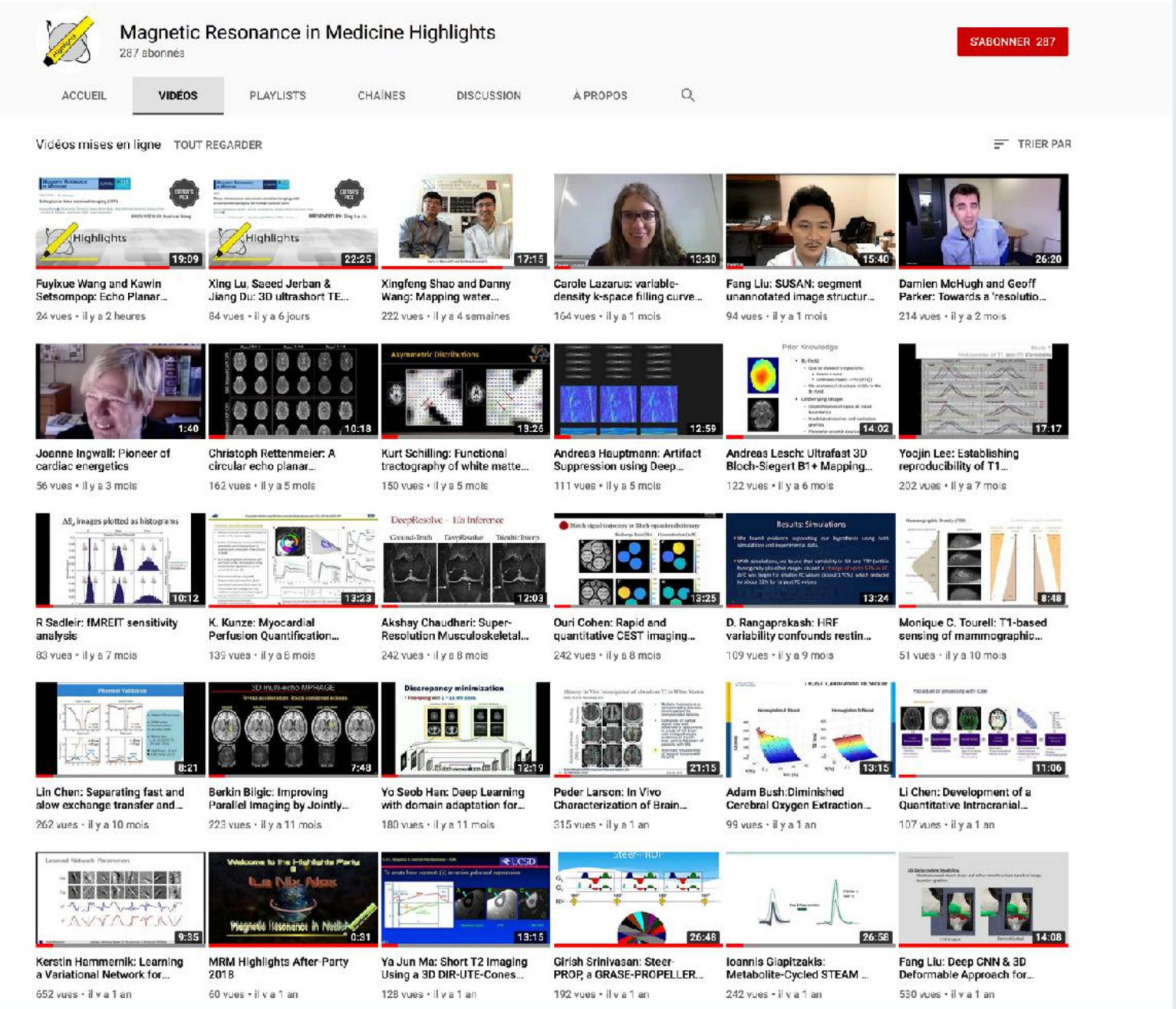
Melissa: I've always loved spectroscopy, ever since I was young, because I consider rainbows and thin film interference on oil spills to be spectroscopy. During my undergraduate experience, I was naturally drawn to it through physics. I found a common passion with my thesis advisor in using the physics of the nucleus and coupling to perform some challenging and interesting work. When I came to graduate school, the CMRR was a large, dynamic group doing pioneering work in spectroscopy, so I started doing research here.

Gülin: Having majored in both physics and chemistry during undergrad, I was always interested in areas where the two fields intersected. I especially loved the fact that I could draw the chemical structure of an unknown compound in the test tube in my chemistry class just by looking at the NMR spectrum. I moved into biochemistry during my PhD to study protein structure and dynamics. At CMRR I was finally studying chemistry within its intact context, *in vivo*.

MRMH: How would you summarize the work performed in this study?

Melissa: I have typically worked with edited spectroscopy, using molecular coupling in order to uncover tiny resonances. This was an opportunity to understand the extent to which those tiny resonances can be robustly quantified within the entire spectrum, measuring all of the peaks; and also to push the quality control standards of what we're measuring.

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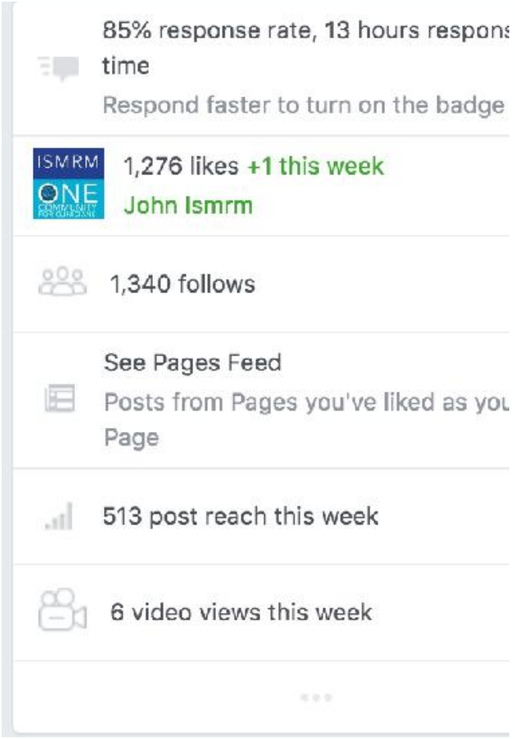

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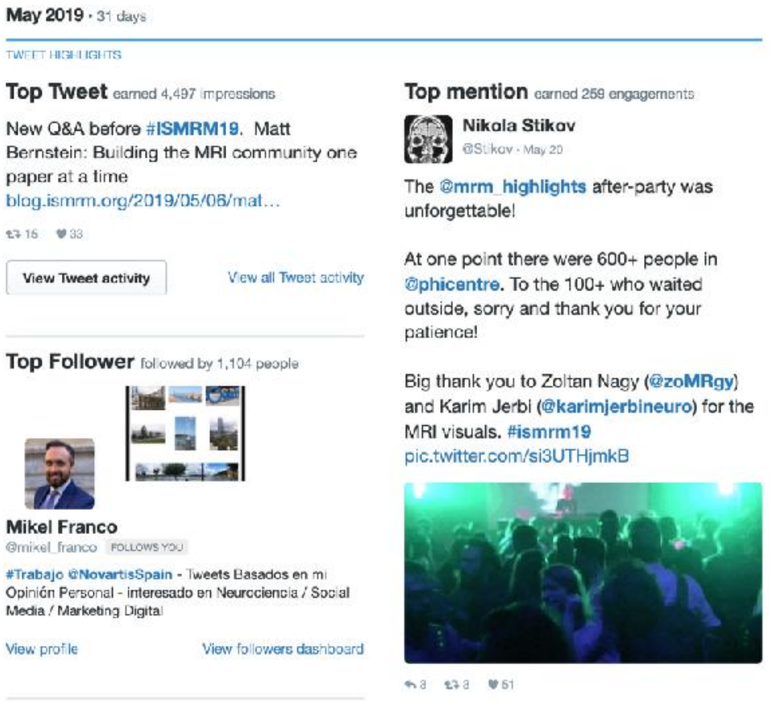
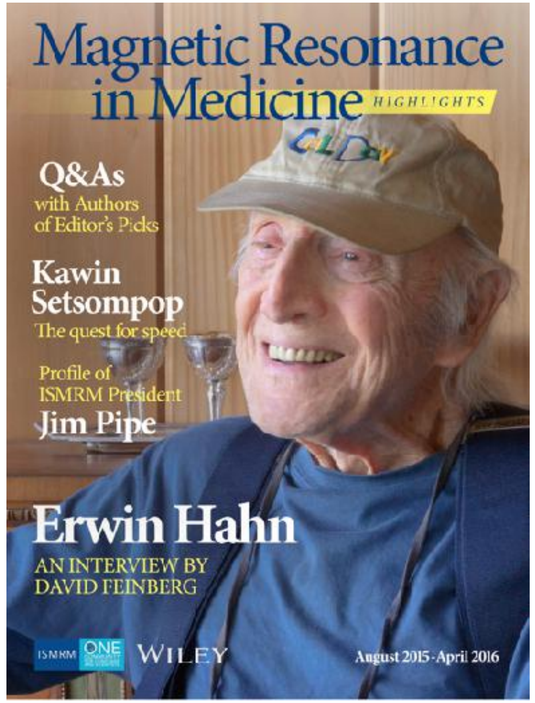
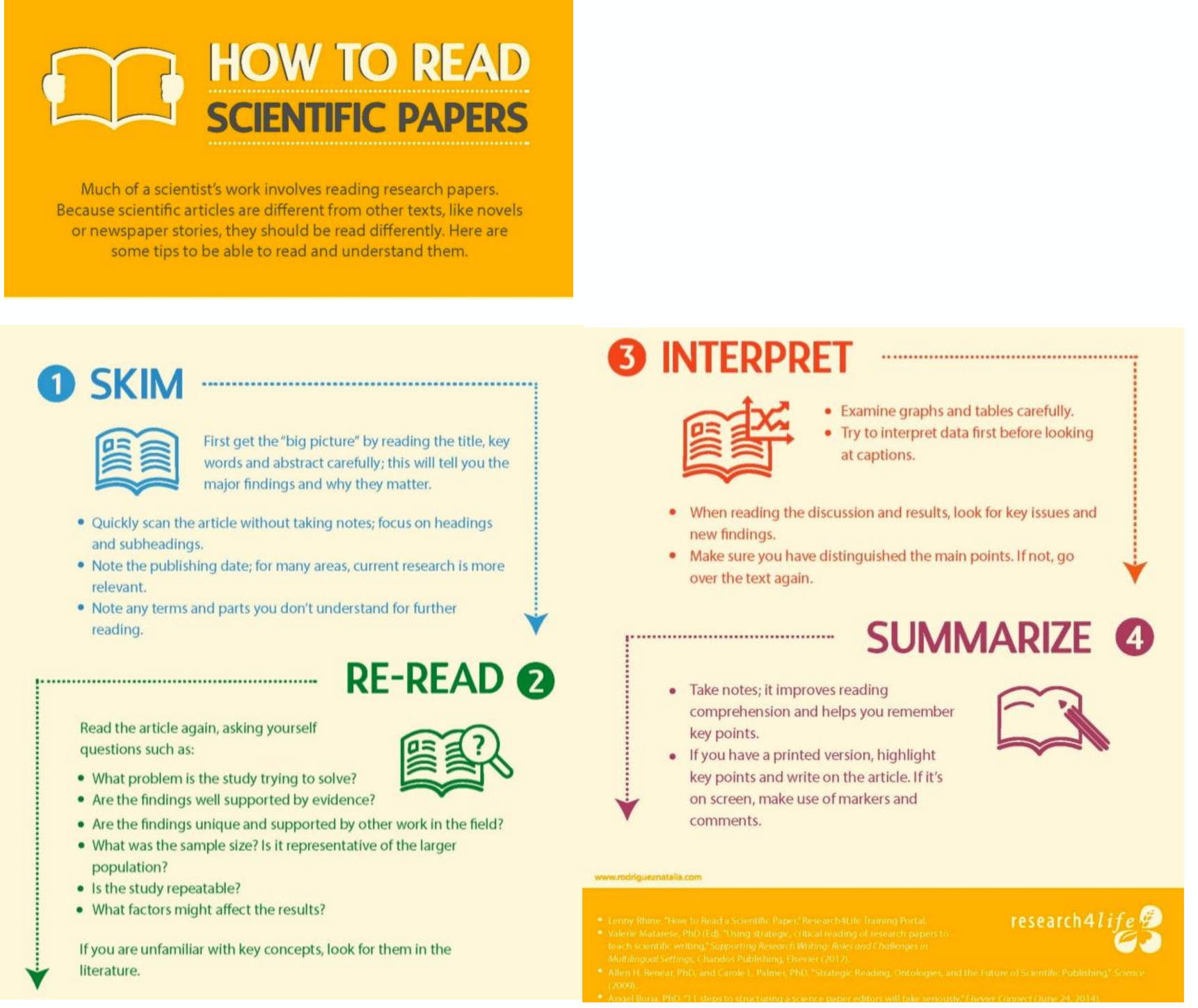


Magnetic Resonance in Medicine Highlights



Sum-up



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Damien McHugh and Geoff Parker: Towards a 'resolution limit' for DW-MRI tumor microstructural models

218 vues

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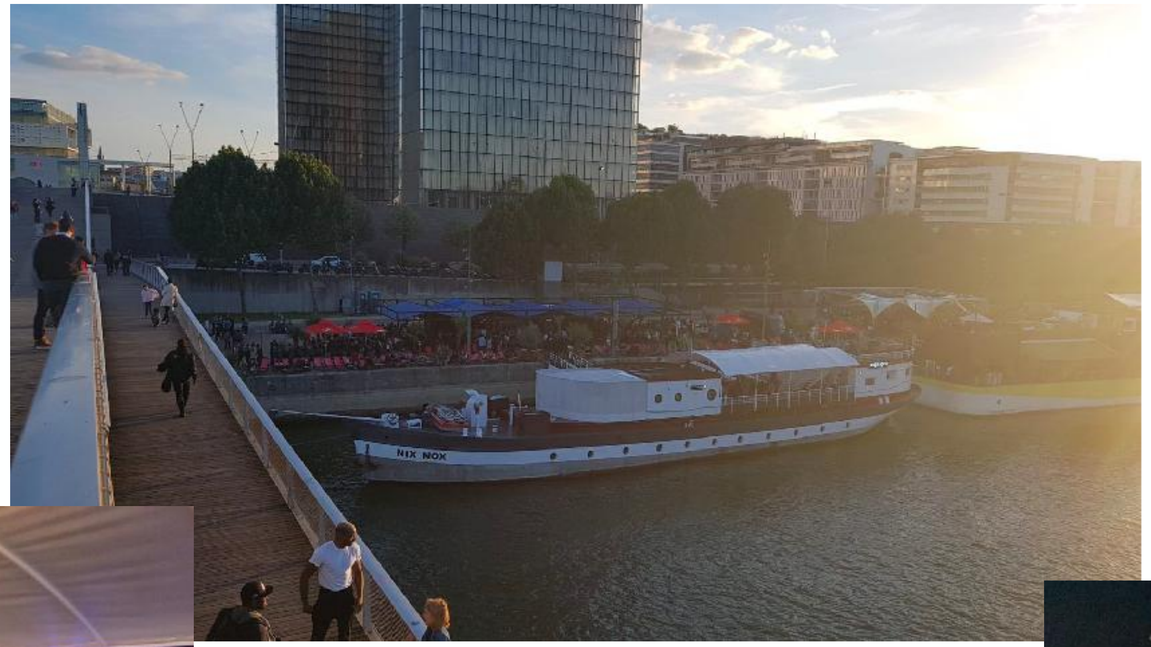

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MRM Highlights 4th annual party in Montreal