Imperial College London

Centre for Academic English

Navigating STEM research texts: Strategies for EAP teachers

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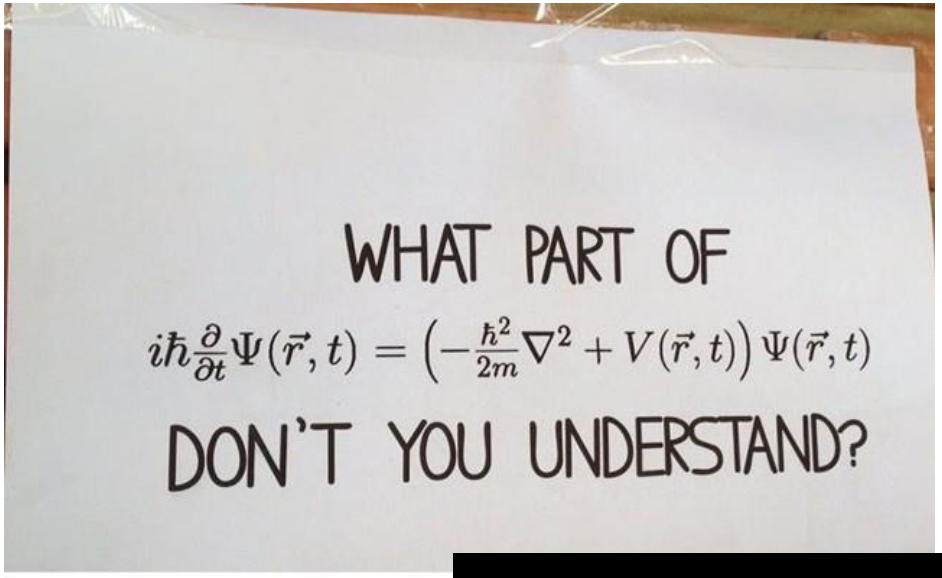
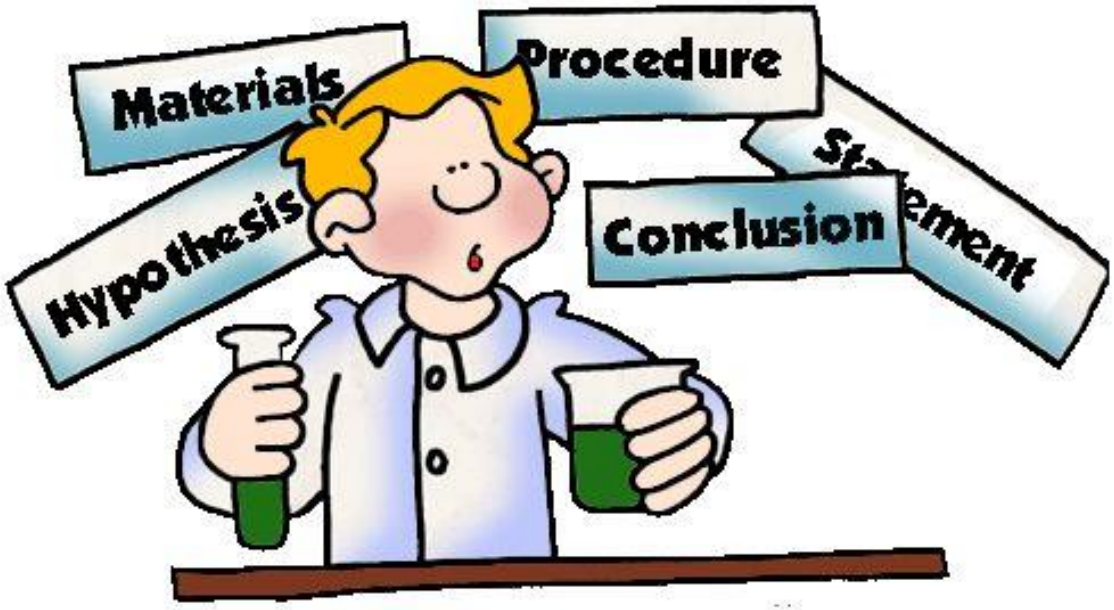

WHAT PART OF
$i\hbar\frac{\partial}{\partial t}\Psi(\vec{r},t) = \left(-\frac{\hbar^2}{2m}\nabla^2 + V(\vec{r},t)\right)\Psi(\vec{r},t)$
DON'T YOU UNDERSTAND?

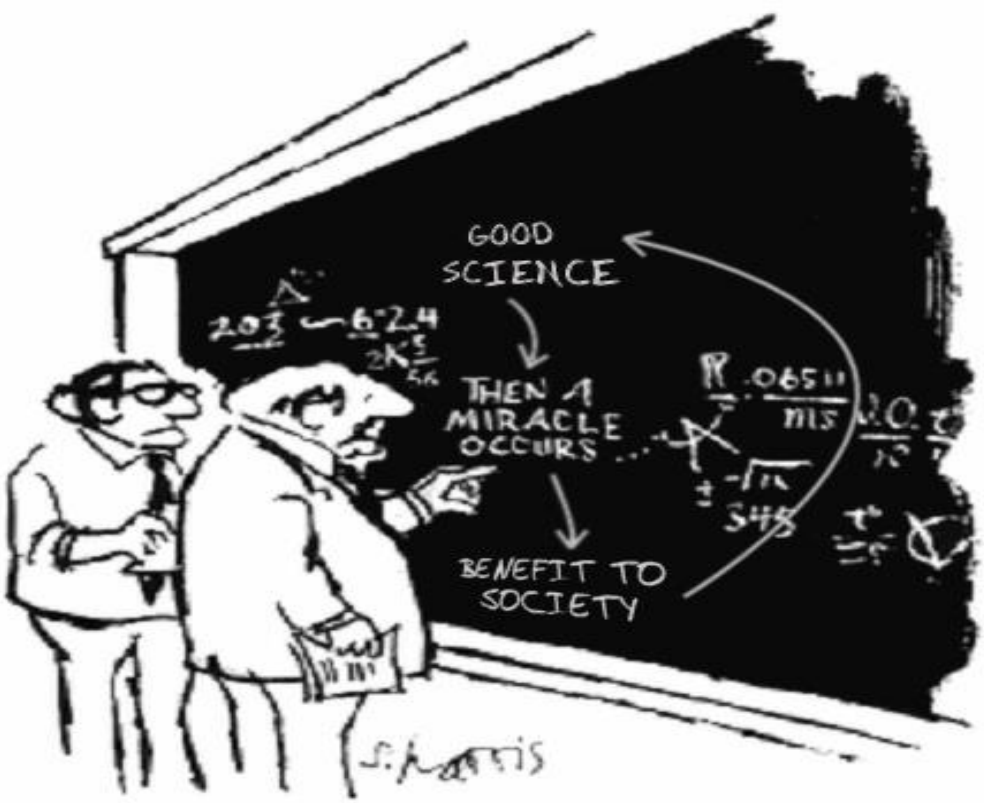

SCARY
SCIENCE

Researchers are equally intimidated



Collaborative, dialogic approach

Assume the science is good, but is it explicit enough?



"I think you should be more explicit here in step two."

Awareness of interdisciplinary audience

The Writing Process

http://phdcomics.com/comics/archive.php?comicid=1732

The Adaptive Fractal Tree (AFT) is a innovative path planning algorithm which is based on the expansion of a repetitive structure (fractal) through the search space. The self-similarity propriety of the tree enables a GPU-based implementation which guarantees the real-time computational standard of a surgical operative environment. Therefore, the trajectory of the needle can be adjusted in real-time considering the soft tissue deformation and brain shift occurring during the operation. The basic AFT structure is composed by arcs and straight lines covering symmetrically the 3D space with a certain aperture which can be selected beforehand. Because of its specific structure, the AFT is able to produce paths that comply with nonholonimic constraints. This propriety makes the AFT particularly suitable for nonholonimic steerable needles such as the bio-inspired EDEN2020 catheter. AFT parameters such as the branches lenght, the maximum tree aperture and the tree growth orientation, can be previously set up in order to fit the specific case and optimize the results. The density of the fractal structure, which grows exponentially with the level of the tree, enables the generation of several collision-free paths. Then, an optimized trajectory can be selected minimising a cost function based on the needle preferential requirements, such as low curvature values and the absence of inflection points.

Fixing cosmetic issues

The games get pretty crazy at English teachers' parties.

The Adaptive Fractal Tree (AFT) is a innovative path planning algorithm which is based on the expansion of a repetitive structure (fractal) through the search space. The self-similarity **propriety** of the tree enables a GPU-based implementation which guarantees the real-time computational standard of a surgical operative environment. Therefore, the trajectory of the needle can be adjusted in real-time considering the soft tissue deformation and brain shift occurring during the operation. The basic AFT structure is composed **by** arcs and straight lines covering symmetrically the 3D space **with** a certain aperture which can be selected beforehand. Because of its specific structure, the AFT is able to produce paths that comply with **nonholonimic** constraints. This makes **the** AFT particularly suitable for **nonholonimic** steerable needles such as the bio-inspired EDEN2020 catheter. AFT parameters such as the **branches lenght**, the maximum tree aperture and the tree growth orientation, can be previously set up in order to **fit the** specific case and optimize the results. The density of the fractal structure, which grows exponentially with the level of the tree, enables the generation of several collision-free paths. Then, an optimized trajectory can be selected minimising a cost function based on the needle preferential requirements, such as low curvature values and the absence of inflection points.

Fixing readability issues

Deconstruction

Joint construction

Independent construction

Text level

The Adaptive Fractal Tree (AFT) is a innovative path planning algorithm which is based on the expansion of a repetitive structure (fractal) through the search space. The self-similarity propriety of the tree enables a GPU-based implementation which guarantees the real-time computational standard of **a surgical operative environment.** Therefore, the trajectory of the needle can be adjusted in real-time considering the soft tissue deformation and brain shift occurring **during the operation.** The basic AFT structure is composed by arcs and straight lines covering symmetrically the 3D space with a certain aperture **which can be selected beforehand**. Because of its specific structure, the AFT is able to produce paths that comply with nonholonimic constraints. This makes the AFT particularly suitable for nonholonimic steerable needles such as the bio-inspired EDEN2020 catheter. AFT parameters such as the branches lenght, the maximum tree aperture and the tree growth orientation, **can be previously set up** in order to fit the specific case and optimize the results. The density of the fractal structure, which grows exponentially with the level of the tree, enables the generation of several collision-free paths. **Then**, an optimized trajectory can be selected minimising a cost function based on the needle preferential requirements, such as low curvature values and the absence of inflection points.

Sentence level

The Adaptive Fractal Tree (AFT) is a innovative path planning algorithm **which is based on** the expansion of a **repetitive structure** (fractal) through the search space. **The self-similarity propriety** of the tree enables a GPU-based implementation **which guarantees** the real-time computational standard of a surgical operative environment. **Therefore,** the trajectory of the needle can be adjusted in real-time **considering** the soft tissue deformation and brain shift occurring during the operation. **The basic AFT structure** is composed by arcs and straight lines covering symmetrically the 3D space **with** a certain aperture **which can be selected** beforehand. **Because of its specific structure,** the AFT is able to produce paths that comply with nonholonimic constraints. **This** makes the AFT particularly suitable for nonholonimic steerable needles such as the bio-inspired EDEN2020 catheter. **AFT parameters** such as the branches lenght, the maximum tree aperture and the tree growth orientation, can be previously set up in order to fit the specific case and optimize the results. **The density of the fractal structure**, **which grows exponentially** with the level of the tree, enables the generation of several collision-free paths. Then, an optimized trajectory can be selected **minimising a cost function based on** the needle preferential requirements, such as low curvature values and the absence of inflection points.

Word level

The Adaptive Fractal Tree (AFT) is a innovative path planning algorithm which is based on the expansion of a repetitive structure (fractal) through **the search space**. The self-similarity propriety of the tree enables a GPU-based implementation which guarantees the real-time computational standard of **a surgical operative environment.** Therefore, **the trajectory of the needle** can be adjusted in real-time considering the soft tissue deformation and brain shift occurring during the operation. The basic AFT structure is composed by arcs and straight lines covering symmetrically the 3D space with a certain aperture which can be selected beforehand. Because of its specific structure, the AFT is able to produce paths that comply with nonholonimic constraints. This makes the AFT particularly suitable for nonholonimic steerable **needles** such as the bio-inspired EDEN2020 **catheter**. AFT parameters such as the branches lenght, the maximum tree aperture and the **tree growth orientation**, can be previously set up in order to fit the specific case and optimize the **results**. The **density** of the fractal structure, which grows exponentially with **the level of the tree**, enables the generation of several collision-free paths. Then, an optimized trajectory can be selected minimising a cost function based on the **needle preferential requirements**, such as low curvature values and the absence of inflection points.

Google Scholar "needle preferential requirements"

Articles

Any time
Since 2018
Since 2017
Since 2014
Custom range...

Sort by relevance
Sort by date

include patents
include citations

Create alert

Your search - **"needle preferential requirements"** - did not match any articles.

Suggestions:

Make sure all words are spelled correctly.
Try different keywords.
Try more general keywords.
Try fewer keywords.
Try your query on the entire web

Steerable needles are a promising technology for minimally invasive surgery, as they can provide access to difficult to reach locations while avoiding delicate anatomical regions. However, because of the unpredictable tissue deformation associated with needle insertion and the complexity of many surgical scenarios, a real-time path planning algorithm with high update frequency would be advantageous. Real-time path planning for nonholonomic systems is commonly used in a broad variety of fields, ranging from aerospace to submarine navigation. In this letter, we propose to take advantage of the architecture of graphics processing units (GPUs) to apply fractal theory and thus parallelize real-time path planning computation.

This novel approach, termed adaptive fractal trees (AFT), allows for the creation of a database of paths covering the entire domain, which are dense, invariant, procedurally produced, adaptable in size, and present a recursive structure. The generated cache of paths can in turn be analyzed in parallel to determine the most suitable path in a fraction of a second. The ability to cope with nonholonomic constraints, as well as constraints in the space of states of any complexity or number, is intrinsic to the AFT approach, rendering it highly versatile. Three-dimensional (3-D) simulations applied to needle steering in neurosurgery show that our approach can successfully compute paths in real-time, enabling complex brain navigation.

Checklist

Text/sentence level problems	Way in
Narrative wrapping	Is there any?
Paragraph function/order of information in paragraph	What is the paragraph telling the reader? Is the flow of information logical to them?
Content information missing/unsupported statements	Are claims supported with evidence?
Sentence start up	Is there one? How does it link back and push forward? Is it used correctly?
Sentence length	Is the sentence overlong? Does this lead to a breakdown in meaning or ambiguity?
Order of information	Is the information in the sentence/paragraph ordered logically? Dangling modifiers?
Relevance of content	Is all content relevant to the key message?
Reference words and substitution	What does 'this' refer to? 'This' what? Who is 'we'?

Checklist

Word level problems	Way in
Verb tense	Methods - is this what you did or the standard method?
Lengthy noun phrases - S/V agreement	Is this a thing? Should we check Google Scholar? Is the noun phrase over-modified? Is the head noun too far from its verb?
Vagueness, weak verbs	Is the overuse of passive leading to weak verbs? Can the sentence be de-nominalised and give the text more 'life' and clarity?
Use of terminology	Is this consistent? An approach is not a method is not a tool is not a device is not a process
Use of 'and' and 'or'	What is the function of the linker in the sentence? Is the meaning clear? Is it being used correctly?
Prepositions - collocations	Evidence of or evidence for?
Articles	New or old information? One of many or the only one?
Modals	Does 'can' mean possibility or ability?

Preparing your Submission

Papers submitted to *Nature Physics* should be accessible to non-specialists; you should ensure that your findings are communicated clearly. Although a shared basic knowledge of physics may be assumed, please bear in mind that the language and concepts that are standard in one subfield may be unfamiliar to colleagues working in another area. Thus, technical jargon should be avoided as far as possible and clearly explained where its use is unavoidable. Abbreviations should be kept to a minimum and should be defined at their first occurrence. The background, rationale and main conclusions of the study should be clearly explained. Titles and abstracts in particular should be written in language that will be readily intelligible to any scientists.

No paper will be rejected for poor language. However, if you would like assistance with writing your manuscript, you can consider asking a colleague whose native language is English for their input and/or use a professional editing service such as those provided by our affiliates Nature Research Editing Service or American Journal Experts. The use of a language editing service has no bearing on editorial decisions and is not a requirement for publication.

References

Carless, D. (2016). Feedback as dialogue. *Encyclopedia of Educational Philosophy and Theory*. P1-6, http://link.springer.com/referenceworkentry/10.1007/978-981-287-532-7_389-1.

Flowerdew, J., 2014. *Academic discourse.* Routledge.

Glasman-Deal, H., 2010. *Science research writing for non-native speakers of English*. Imperial College Press.

Hyland, K., and Hyland, F., 2012. *Feedback in Second Language Writing: Contexts and Issues.* CUP

Mogull, S.A., 2017. *Scientific and medical communication: a guide for effective practice.* Routledge.

Nicol, D., 2010. From monologue to dialogue: improving written feedback processes in mass higher education. *Assessment & Evaluation in Higher Education*, *35*(5), pp.501-517.

Rose, D., and Martin, J.R., 2012. *Learning to Write, Reading to Learn.* Equinox Publishing.

Swales, J., 1990. *Genre analysis: English in academic and research settings*. Cambridge University Press.