

Writing for impact.

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Professor, HSPH

A few credits & disclaimers...

Scientist, not an editor or professional writer

In last 4 years, 4 NPG, 2 PNAS

PI of T32 training grant

41 past and current trainees:

12 PIs, 10 tenured (2 physics, 5 engineering, 3 medicine), 7 full prof

I can't fix grammar, spelling, ESL

but I can offer suggestions to improve understanding & impact.

To get it, have you ever had to read a paragraph 3 times?

10 golden rules for effective writing

1. In science, you are what you write.
2. Style (Strunk & White), Structure (RA Day), Spirit (Ramon y Cajal)
3. Good writing cannot overcome bad science.
4. Good science demands strong writing
5. Use definite, specific, concrete language
6. Use parallel construction for coordinate ideas
7. Emphasis position of a sentence is the end
8. Avoid sentences in loose succession;
instead used AB, BC, CD.....
9. The uncertainty principle: truth vs clarity
10. Find a style that you like. Analyze it. Emulate it.

- **Elements of Style** Strunk & White
- **How to write and publish a scientific paper**
RA Day
- **Advice for a young investigator**
Santiago Ramon y Cajal

Check out:

http://deas.harvard.edu/projects/weitzlab/paper_guide.pdf

Start by writing the entire paper in two sentences!

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5. Use definite, specific, concrete language

A period of unfavorable weather set in.

It rained every day for a week.

Here we report novel biophysical properties of cells isolated from two highly inbred strains of rats that are known to exhibit characteristically different degrees of airway responsiveness *in vivo*.

Here we report novel biophysical properties of the ASM cell isolated from the relatively hyperresponsive Fisher rat versus the relatively hyporesponsive Lewis rat.

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6. Use parallel construction for coordinate ideas

Formerly, science was taught by the textbook method,
while now the laboratory method is employed

Formerly, science was taught by the textbook method;
now it is taught by the laboratory method.

6. Use parallel construction for coordinate ideas

We focused upon the ability of the ASM cell to remodel and generate contractile force – and the molecular basis of these processes.

To probe remodeling dynamics, we measured spontaneous nano-scale motions of microbeads tightly anchored to the cytoskeleton (CSK). To quantify the contractile scope, we measured changes in cell stiffness and distribution of traction forces exerted by these cells in response to a panel of contractile and relaxing agonists.

We present evidence that the strain-related phenotypic differences in airway responsiveness stem largely from biophysical differences in the contractile events at the level of the ASM cell, providing thereby a direct causal link between them.

We focused upon the ability of the cytoskeleton (CSK) of the ASM cell to stiffen, to generate contractile forces, and to remodel.

To measure cell stiffness we used magnetic twisting cytometry, to measure contractile forces we used traction microscopy, and to measure remodeling dynamics we quantified spontaneous nano-scale motions of microbeads tightly anchored to the CSK.

After challenge with a panel of contractile and relaxing agonists, cells from the Fisher rat showed greater stiffening, greater contractile scope, and faster CSK remodeling.

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7. In any sentence, the emphasis position is the end.

What is this essay about?

Humanity has hardly advanced in fortitude since that time, though it has advanced in many other ways.

What is this essay about?

Since that time, humanity has advanced in many ways, though it has hardly advanced in fortitude.

7. In any sentence, the emphasis position is the end.

The emergence of *plasmodium falciparum* in Africa within the past 6000 years as a result of changes in human behavior and mosquito transmission has recently been hypothesized.

According to a recent hypothesis, virulent *plasmodium falciparum* emerged in Africa within the past 6000 years as a result of changes in human behavior and mosquito transmission.

Emphasis position

(Use definite, specific, concrete language;
have a point to emphasize!)

Stretch-induced fluidization of the living cell

The cytoskeleton (CSK) of a living cell is continuously undergoing structural rearrangements. In a static mechanical environment, these rearrangements are largely driven by ATP-dependent processes. By contrast, in a highly dynamic environment, CSK rearrangements might also be driven by an alternate source of energy provided by externally applied mechanical strain. As a consequence, strain application could significantly alter cell mechanics. To test this hypothesis we studied the effect of a single cycle stretch on the viscoelasticity of living cells.

Fluidization of the living cell by stretch

The cytoskeleton (CSK) of living cells has been recently described as an energy landscape in which CSK elements are trapped in energy wells so deep that thermal energy is insufficient to push elements over energy barriers. Externally applied mechanical strain might provide sufficient energy for these elements to overcome energy barriers, however, and thus fluidize the CSK matrix. To test this hypothesis in living cells, we studied the effect of a single strain cycle on cell viscoelasticity.

Origin of Species: Emphasis position is at then end of a sentence, paragraph, chapter, or even book.

How did Darwin do it?

- **There is grandeur in this view of life, with its several powers, having been originally breathed by the Creator into a few forms or into one; and that, whilst this planet has gone cycling on according to the fixed law of gravity, from so simple a beginning endless forms most beautiful and most wonderful have been, and are being evolved.**

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**8. Avoid sentences in loose succession;
instead use expectation AB, BC, CD.....**

Also, use logical connecting words (this, thus, as a result, nonetheless)

We demonstrate that the tendons associated with the axial skeleton derive from a heretofore unappreciated fourth component of the somites. Sclereaxis (Scx), a bHLH transcription factor, marks this somitic tendon progenitor population at its inception, and is continuously expressed through differentiation into mature tendons. This family of transcription factors...

We demonstrate that the tendons associated with the axial skeleton derive from a heretofore unappreciated fourth component of the somites. This somitic tendon progenitor is marked at its inception by the gene Sclereaxis (Scx), a bHLH transcription factor. This family of transcription factors...

**8. Avoid sentences in loose succession;
instead use expectation AB, BC, CD.....**

Also, use logical connecting words (this, thus, as a result, nonetheless)

The airway smooth muscle (ASM) cell is the key end-effector of acute airway narrowing in asthma. Here we report novel biophysical properties of the ASM cell isolated from the relatively hyperresponsive Fisher rat versus the relatively hyporesponsive Lewis rat.

In asthma, the key end-effector of acute airway narrowing is the airway smooth muscle (ASM) cell. Here we report novel biophysical properties of the ASM cell isolated from the relatively hyperresponsive Fisher rat versus the relatively hyporesponsive Lewis rat.

**8. Avoid sentences in loose succession;
instead use expectation AB, BC, CD.....**

Also, use logical connecting words (this, thus, as a result, nonetheless)

Remodeling of the CSK of the ASM cell is thought to play an important role in airway hyperresponsiveness. A 2-D network of links (contractile filaments) and connecting nodes (focal adhesions), and evolving in discrete time steps, was used to simulate remodeling as well as associated muscle adaptations. Each link had a probability of link formation and depolymerization, and was formed with a fully adapted classical force-length relationship. Network force was

Airway hyperresponsiveness is thought to be attributable in part to remodeling of the ASM cytoskeleton CSK. To account for CSK remodeling as well as associated muscle adaptations, we have modeled the CSK as a 2-D network of nodes (focal adhesions) connected by links (contractile filaments). Each link had a probability of formation and depolymerization, and was formed with a fully adapted classical force-length relationship. Network force (F) was computed as

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Heisenberg's uncertainty principle:

In physics, the position x and the momentum p cannot both be specified to arbitrary precision.

$$\Delta x \Delta p \geq \hbar/2$$

In language, the truth T and the clarity C cannot both be specified to arbitrary precision.

$$\Delta T \Delta C \geq \hbar/2$$

To communicate effectively, tilt away from truth and toward clarity!

Any fool can demonstrate that a question at hand is complicated.

Only with deep insight can you show that it is actually clear, simple, understandable

If you try to be 100% truthful you will be 100% unclear! And conversely.

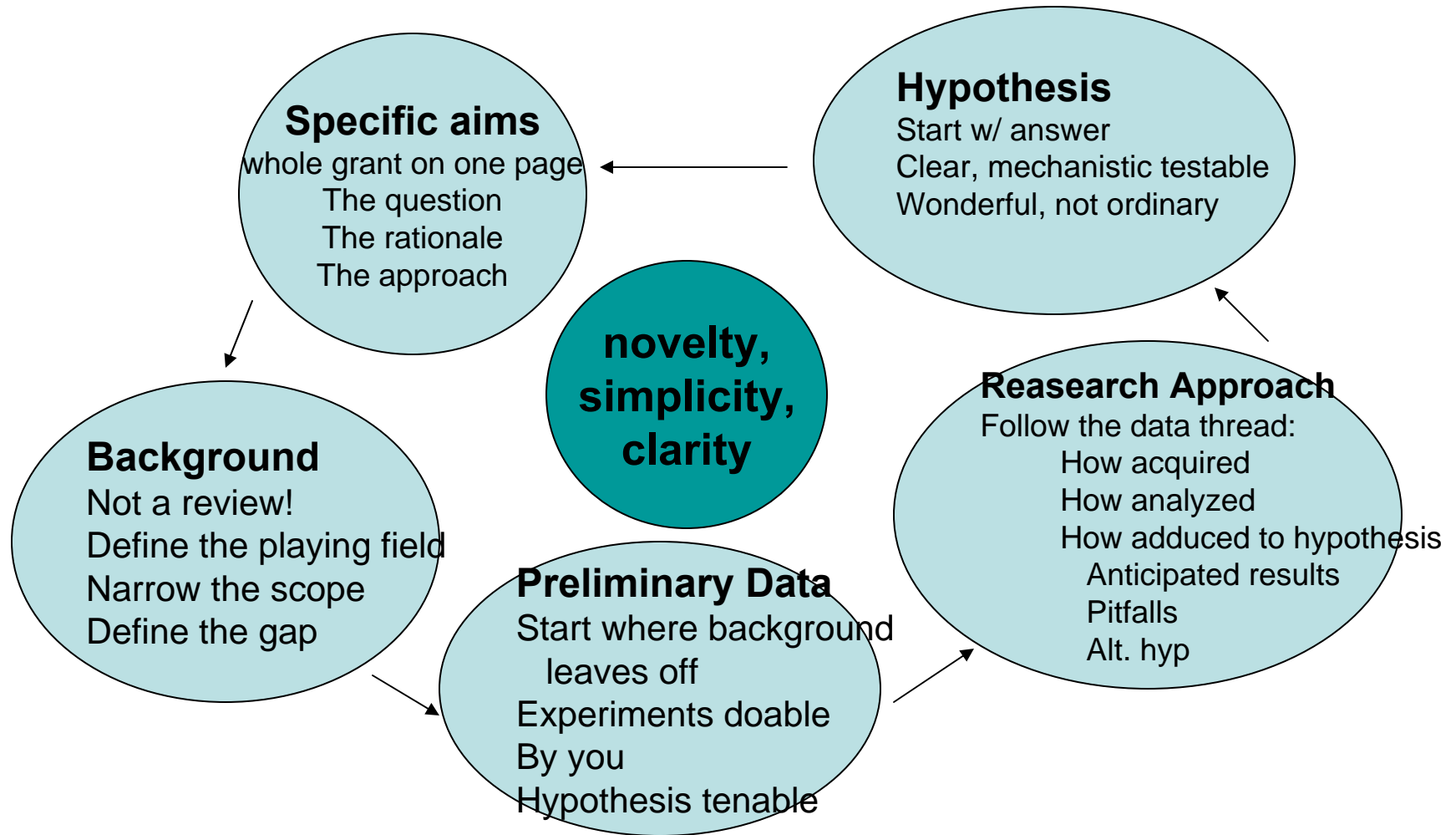
To avoid error or misleading statements, signal to the reader using qualifiers:

often, usually, sometimes, approximately....

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9. In grants, write as if reader is tired and may stop



Clear writing reflects clear thinking. Don't leave it to reviewer to sort things out. Reviewer will fight for only 1 grant in 10. Tell him/her why it should be yours. Biggest risk is playing it safe. Kiss of death: descriptive, incremental, overambitious Clear-eyed enthusiasm inappropriate in manuscript but desirable in grant

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Santiago Ramon y Cajal

Whatever is good, if brief, is twice as good.

Scientific writers should govern themselves by the following rules:

- 1) Have something to say.
- 2) Say it.
- 3) Stop once it is said
- 4) give the article a suitable title and order of presentation.