WHAT'S WRONG WITH THIS LAGRANGEAN?

N. David Mermin

A few months ago I found myself living one of my milder visions of hell, trapped on a flight to Los Angeles, having forgotten to bring along anything to read but *Physical Review Letters*. Finishing the two articles that had inspired me to stuff it in my briefcase before we even reached the Mississippi, I decided to make the best of a bad thing by taking the opportunity to expand my horizons. Scanning the table of contents, I was arrested by a title containing the word "Lagrangean."

Funny, I thought, it's not often you see misprints so blatantly displayed. But when I turned to the article, there it was again, "Lagrangean," in the title and scattered through the text. Well, I thought, an uncharacteristic failure of the copy editing process. The authors were foreign and apparently didn't know how to spell. Copy editors aren't physicists, the word is surely in few if any dictionaries, and so it slipped through.

But I had nagging doubts. Easily resolved, I thought: You can't write an article in theoretical particle physics without a Lagrangian, so I can check it right now. Well, it turns out to be not quite that easy. To be sure, you can't do particle physics without a Lagrangian, but you don't have to call it anything more than L, and many don't. Nevertheless, I found a Lagrangian, fully denominated, in one more article, and there it was, shimmering derisively before my eyes again: "Lagrangean."

Now I am not a man of great self-confidence, and my secretary will testify that I am a rotten speller. Was I fooling myself? Could "Lagrangean" be right, and my conviction that it should be "Lagrangian" an orthographic hallucination induced by the absence of better things to read, like a mirage in the desert? Please ask yourself this, dear reader, before reading on: Would it have startled you?

When the plane landed in Los Angeles, I tooled up the freeway to the house of my hosts and breathlessly asked, "How do you spell 'Lagrangian'?"

"I dunno," said he, but she said without hesitation, "L-A-G-R-A-N-G-I-A-N," and I felt hope for my sanity. A quick tour revealed that every book in the house on mechanics and field theory spelled it with an *i*. I *was* sane! But what was going on at *Physical Review Letters*?

The next day at UCLA and the following day at Santa Barbara, I asked almost every physicist I met how to spell "Lagrangian" (all got it right) and whether they had ever noticed *Physical Review Letters* spelling it wrong (none had). A transitory anomaly, I thought—an accident limited to the issue I happened to put in my briefcase. But when I had a free moment I went off to the library, just to make sure.

This is what I discovered: *Physical Review Letters* has been systematically misspelling "Lagrangian" with an *e* instead of an *i* since the middle of 1985. At the start of July and earlier it is "Lagrangian"; by the end of the month and thereafter it is uniformly "Lagrangean." (In the interior of July 1985 it oscillates.) *They have been doing it for over two years*, and nobody I asked had noticed! Nobody I have asked since has noticed! Have *you* noticed?

The disease is confined to *Physical Review Letters*. As far as I can tell *Physical Review* in all its multitudinous varieties is still spelling the word correctly.

I am publishing this discovery here for the first time. I claim exclusive credit for it, my extensive random samplings having led me to conclude that nobody else ever noticed "Lagrangean" during the entire two and a half years it has been lurking in the pages of *Physical Review Letters*. My discovery raises at least two serious questions, of which I save the more disturbing for last.

Question 1. What is going on here? Why is *Physical Review Letters* misspelling "Lagrangian"? One can invent theories. To be sure, the man's name was Lagrange, ending, as any undergraduate can tell you, with an *e*. But if you write "Lagrangean," then shouldn't you pronounce it "luh-GRAN-jin," and doesn't everybody actually say "luh-GRAN-*jee*-in"? Doesn't "Lagrangean" lead unavoidably to "Hamiltonan," which gives me, for one, a case of the giggles, and certainly has never been sighted in the pages of *Physical Review Letters* or any other journal of repute? Ah, but "Hamilton" doesn't end with *e*. Well, what about people who do end with *e*? Try adjectivizing them. Don't you want to turn their *e* into an *i* before the *an*? Or do you?

Such talk, fascinating as it can become, utterly misses the point. English spelling is entirely irrational. Theorizing about it is a form of what Einstein called "brainschmaltz." There are no rules, only precedent. And precedent demonstrates unanimously, overwhelmingly and unambiguously that for at least a quarter of a century the English word has been and remains "Lagrangian."

I devoutly hope the answer is that a bug crept into their spelling checker in the summer of 1985, but I fear the worst, and I therefore here declare that *Physical Review Letters* has no right to tamper with established usage. One can only hope the editors will soon come to their senses.

Question 2. The more disturbing question: Why has nobody noticed? Why did this aberration lie undiscovered for more than two years, only coming to light because one careless

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man allowed himself to fall into a dreadful trap that any prudent person would have taken simple measures to avoid? Can it be that physicists no longer know how to spell? No, because when I asked a random sample, they all spelled it "Lagrangian." Can it be that they are all speed readers, zooming on to the next word as soon as they get past the opening "Lag"? I don't think so. It seems to me that very fast readers take in whole lines at a time, and when you look at a whole line and you know how to spell, what you see glaring out at you, defiantly thumbing its nose, is "Lagrangean." We do know how to spell. We do see what we read. I can think of only one other explanation, but it is an explanation so alarming, so staggering in its implications, that I hesitate to give voice to it:

Can it be that nobody any longer reads *Physical Review Letters*?

We've known for some time that, roughly speaking, nobody any longer reads anything but preprints, the archival journal of choice, which for many years now has been *Physical Review Letters*, and secondary references cited in these two primary sources. But the preprints have been coming thicker and faster. And *Physical Review Letters* now publishes almost as many pages each month as *all* of *Physical Review* did back in 1956, when I was starting graduate school. (And at that time *Physical Review* included the letters as well as containing within one set of covers all of *A*, *B1*, *B15 I*, *B15 II*, *C*, *D1* and *D15*.) Yet slim as it was, and few as the other journals were, back in those easygoing days *Physical Review* was widely known as "the green plague." *Physical Review Letters* is now as big as the green plague of the 1950s, and the white plague (preprints) is even bigger. Is it then indeed possible that people have stopped reading it?

Few, of course, when asked about their reading habits will give you a straight answer, but I submit for public discussion what has to be regarded as a very powerful piece of evidence that the pages of *Physical Review Letters* are now examined no more than any of the other hundred thousand or so pages that pile up each month in our physical science libraries. I submit that whoever decided to start systematically misspelling "Lagrangian" was unwittingly (or could it have been wittingly?) conducting a beautiful experiment that could not have been more ingeniously contrived to get an honest measure of how carefully people actually look at *Physical Review Letters*.

The results of that experiment are disconcerting, with implications for at least two major problems that we have not adequately faced as a profession: the disaster looming over science libraries, and therefore over science itself, as a result of the irresponsible way we have allowed scientific journals to proliferate; and, not unrelatedly, the lamentable decline in the quality of scientific writing.

I hope to address both of these problems in subsequent columns. ■