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Ms. Particular Presents: *Due To*

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Today we'll look at "due to," which Ms. Particular hates with a white-hot passion. Theodore Bernstein¹ and Bryan Garner² (major gods in Ms. Particular's pantheon) object to "due to" on purely grammatical grounds. But Ms. Particular's antipathy runs deeper than mere grammar.

Your most important job as a scientist is to determine causality, to tell the rest of us what the mechanism is between cause and effect. Unfortunately, many technical writers use "due to" to mean everything from "vaguely associated with" to "because of." And that's why Ms. Particular objects to "due to"; not because it is (usually) incorrect grammatically, but because it's almost always sloppy and imprecise.

Garner devotes almost a whole page to "due to" (and why one writer [L.V. Payne] calls it a "graceless phrase, even when used correctly." Garner advises writers to "avoid due to altogether." Theodore Bernstein (legendary editor of the New York Times) says about "due to": "The careful writer, who does not wish to be suspected of negligence, will...use 'because of,' which has a less casual flavor and is above suspicion grammatically."

1. Theodore M. Bernstein, *The Careful Writer: A Modern Guide to English Usage* (New York, Atheneum, 1977), pp. 152–153.
2. Bryan A. Garner, *Garner's Modern American Usage* (Oxford University Press, 2003), pp. 277–278.

“Due to” should be used as an adjectival phrase following a “to be” verb

If you cannot substitute “attributable to,” replace “due to”

Other uses blur the distinction between “caused by,” “because of,” “associated with,” “related to,” and other phrases that have definite but subtle distinctions in the degree of causality

If “due to” is used to begin a sentence, it’s probably a misplaced modifier, too

Writing “due to the fact that” is an egregious abuse of reader’s sensibilities

Careless writers often use “due to” as a thoughtless shorthand to compress complex causal relationships into one easy, six-character catch-phrase that has become nearly meaningless because of overuse. As used in most scientific writing, “due to” completely blurs the degree of (or even the direction of) causality.

Strictly speaking, “due to” means “attributable to.” “Stan’s fall was due to the icy sidewalk” is grammatically correct (“Stan fell due to the icy sidewalk” is not), but it is imprecise and probably incomplete. Maybe Stan's new shoes with the slick soles also contributed to the fall, or his natural clumsiness, or the seven bags of groceries he was carrying, or his ogling the statuesque brunette instead of paying attention to his footing, or the six vodka martinis he drank before he stepped outside. To say the fall was “due to” the sidewalk grossly oversimplifies what actually caused Stan's fall.

In the same way, when scientists use “due to” indiscriminately as a substitute for “caused by,” “arising from,” “because of,” “associated with,” “owing to,” or any of dozens of other precise terms, the mechanism of what is causing what gets murky.

Every time you’re tempted to write “due to,” ask yourself “What’s really going on here? What cause and effect am I trying to describe? What’s the mechanism?” Chances are, “due to” will not suffice to properly convey that relationship.

An illustrative “due to” example...

“Previous work has shown that tips made from softer magnets, such as nickel or cobalt, significantly enhance spin relaxation rates *due to* thermal fluctuations of the magnetic moment.”

What’s going on here? Does “due to” mean “caused by” or “because of”?

Are only *some* spin relaxation rates (only those caused by thermal fluctuations) affected?

Or do the thermal fluctuations cause the enhanced spin relaxation rates?

Other questionable “due to” examples, all from recent papers published in *PRL*:

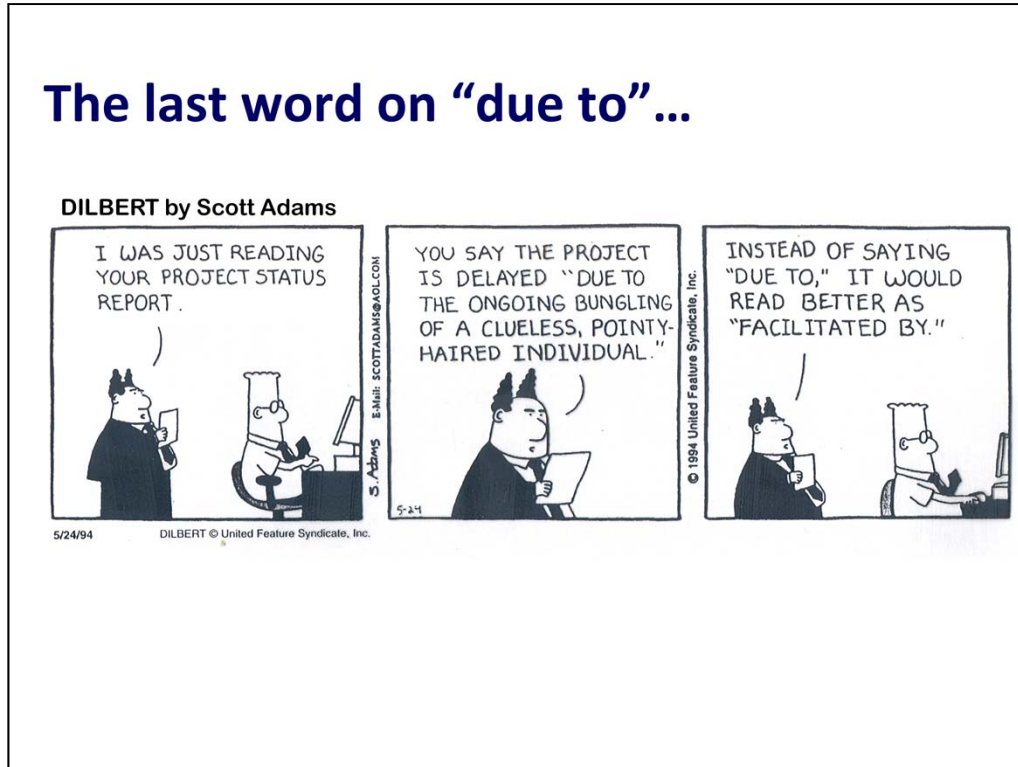
“Recently, several femtosecond-laser techniques have demonstrated molecular excitation to high rotational states with a preferred sense of rotation. We consider collisional relaxation in a dense gas of such unidirectionally rotating molecules, and suggest that due to angular momentum conservation, collisions lead to the generation of macroscopic vortex gas flows.”

“Surprisingly, we find that for long wires the voltage predominantly drops close to one end of the quantum wire due to a thermoelectric effect.”

“We demonstrate, through experiment and theory, enhanced high-frequency current oscillations due to magnetically-induced conduction resonances in superlattices.”
[The incorrect hyphen between “magnetically” and “induced” will be dealt with separately. Ms. P.]

“The dynamics of the coherent structures is controlled by the competition between the phase-space island formation due to the nonlinear particle trapping and the island destruction due to the free streaming.”

Due to a splitting headache, Ms. Particular is unable to provide any more examples...



Just say “no” to “due to”! Do your job as a scientist, and make the causal relationship clear.