QUARK PRONUNCIATION: RHYMES AND REASONS

David Mermin's meanderings on the proper sounding of *quark* (December 1993, page 9) missed the mark. One long-established cardinal rule for the English language is this: For every general rule on pronunciation there is a least one exception. Dozens of writers, including such luminaries as Mark Twain, Bertrand Russell and George Bernard Shaw, have had fun with this property. Instead of generating loopholed rules, Mermin's quest for *quark* pronunciation should have led him to the library for a few minutes' research in etymology.

According to the *Dictionary of Science* (Hammond–Barnhart, 1986), *quark* was coined by the American physicist Murray Gell-Mann from the phrase "three quarks" in *Finnegans Wake*, a novel by James Joyce. Unfortunately, this reference provides no guide to the pronunciation of *quark*. *The American Heritage Dictionary* (1982) cites the etymology less positively: "Poss. < *Three quarks for Muster Mark!*, a line in *Finnegans Wake*, by James Joyce (1882–1941)," the "poss. <" meaning "possibly derived from." The pronunciation is given as *kwôrk*, in which the *ô* sound is indicated to be equivalently represented by *paw* or *for*. None of my cosmopolitan acquaintances rhyme the front vowel of *forepaw* with the end vowel. Our *paw* pronunciation would favor *quark–park* rhyming, and *for* would favor *quark–pork*. So there is no help here for our onomatomania.

While these two references point to *Finnegans Wake* as the source of *quark*, the sense there is not explained. *Webster's Third New International Dictionary* (unabridged, 1965) defines *quark* as "\'kwȯrk \ *vi* [imit.] *archaic*: CROAK," in which *ȯ* is pronounced as in *saw*, *all* or *saurian*, clearly specifying, for my dialect, at least, that *this* manifestation of *quark* rhymes with *park*. *The Oxford English Dictionary* (1978) also defines *quark* as an "imitative" verb meaning "to croak," with the *quar* part rhyming with *quarrel*, closer to *park* than *pork*. This reference cites three usage examples, one being by D. Jordan, *Forest Tithes* (1893): "The herons quarked harshly." From these latter two references, it is apparent that *quark* is onomatopoeic, sounding somewhere between a quack and a squawk.

Joyce used *quark* for its rhyming sound in the singing verse that opens book II, chapter 4, of *Finnegans Wake*:

— Three quarks for Muster Mark!
Sure he hasn't got much of a bark
And sure any he has it's all beside the mark.
But O, Wreneagle Almighty, wouldn't un be a sky of a lark
To see that old buzzard whooping about for uns shirt in the dark
And he hunting round for uns speckled trousers around by Palmerstown Park?
Hohohoho, moulty Mark!
You're the rummest old rooster ever flopped out of a Noah's ark
And you think you're cock of the wark.
Fowls, up! Tristy's the spry young spark
That'll tread her and wed her and bed her and red her
Without ever winking the tail of a feather
And that's how that chap's going to make his money and mark!

Overhoved, shrillgleescreaming. That song sang seaswans. The winging ones. Seahawk, seagull, curlew and plover, kestrel and capercallzie. . . .

Clearly, here *quarks* are the squawks of seabirds, and *quark* rhymes with *mark*, *bark*, *lark*, *dark*, *park* and so on. No *pork* here!

So why have so many physicists mutated *quark* into *quork*? Can it be possible that latter-day physicists lack literary awareness? May our liberal arts peers justly surmise that fondness for physics fosters philistinism?

Whatever the answers may be, a question remains: Why did Gell-Mann select a squawking sound from

Finnegans Wake to represent an elusive particle? One may guess that it was because *Finnegans Wake* covers a cosmic span of humanity, all time occurs simultaneously in it, and multiple meanings are present in every line. Yet it would seem that *snark* would have been more appropriate, from Lewis Carroll's *The Hunting of the Snark, An Agony in Eight Fits* (1876)—clearly analogous to the pursuit of the eightfold way. The last two verses, as follows, in which I have replaced *Snark* by *Quark*, suggest that more mysteries remain to be uncovered:

They hunted till darkness came
on, but they found
Not a button, or feather, or
mark,
By which they could tell that
they stood on the ground
Where the Baker had met with
the Quark.

In the midst of the word he was
trying to say,
In the midst of his laughter
and glee,
He had softly and suddenly
vanished away—
For the Quark *was* a Boojum,
you see.

CARSTEN M. HAALAND
1/94 *Oak Ridge, Tennessee*

The following entry from *The American Heritage Dictionary of the English Language* (third edition) should settle the question of the source of *quark*. The debate over the pronunciation, however, will likely continue.

quark[1] (kwôrk, kwärk) . . . [Possibly from *Three quarks for Muster Mark!*, a line in *Finnegans Wake* by James Joyce.] **WORD HISTORY**: *"Three quarks for Muster Mark!/Sure he hasn't got much of a bark/And sure any he has it's all beside the mark."* This passage of James Joyce's *Finnegans Wake* is part of a scurrilous 13-line poem directed against King Mark, the cuckolded husband in the Tristan legend. The poem and the accompanying prose are packed with names of birds and words suggestive of birds, and the poem is a squawk, like the cawing of a crow, against King Mark. Thus, Joyce uses the word *quark*, which comes from the standard English verb *quark*, meaning "to caw, croak" and also from the dialectal verb *quawk*, meaning "to caw, screech like a bird." But Joyce's *quark* was not what it has become: "any of a group of hypothetical subatomic particles proposed as the fundamental units of matter." Murray Gell-Mann, the physicist who proposed these particles, in a private letter of June 27, 1978, to the editor of the *Oxford English Dictionary*, said that he had actually been influenced by Joyce's work in naming the particle, although the influence was subconscious at first. Gell-Mann was thinking of using the pronunciation (kwôrk) for the particle, possibly something he had picked up from *Finnegans Wake*, which he "had perused from time to time since it appeared in 1939. . . . The allusion to three quarks seemed perfect" (originally there were only three subatomic quarks). Gell-Mann, however, wanted to pronounce the word with (ô) not (ä), as Joyce seemed to indicate by rhyming words in the vicinity such as *Mark*. Gell-Mann got around that "by supposing that one ingredient of the line 'Three quarks for Muster Mark' was a cry of 'Three quarts for Mister . . .' heard in H. C. Earwicker's pub."

KALMAR-R. STEVENSON
1/94 *Anaconda, Montana*

As a member of the Acoustical Society of America, my husband gets PHYSICS TODAY. When he saw David Mermin's column "A Quarrel We Can Settle," he brought it straight to me, because I am an expert in exactly the type of problem Mermin tackled there. Mermin is absolutely right about the pronunciation of *quark*. It rhymes with *fork* because it is one of the *war* words. He is also correct in concluding that one can't learn much from the pronunciation of unstressed syllables, since their vowel sounds are too grossly slighted to prove anything.

In one-syllable words like *quark*, stress is not a problem. The letter *a* is short, as in *act*, when it is followed by most single consonants or consonant clusters, as in *can*, *camp*, *camps* and *catch*. But in English the letter *r* always alters the sound of the vowel before it. When *r* is final after an *a* or begins a consonant cluster after *a*, the short *a* becomes broad, as in *car* and *card*. But, but, but! The sound of *w* before an otherwise short *a* also makes the *a* go broad, as in *swab*, *watch*, *squad*, *swamp*, *want*, *swap*, *wash* and *watt*. This holds true unless the sound following the *a* is a guttural, as in *whack*, *wax*, *wag* and *swank*.

All right. Now, you have already knocked your *a* on the head with a *w* and turned it into a broad *a*, which sounds like a short *o*. Notice these rhymes for the list beginning with *swab*: *rob*, *scotch*, *rod*, *romp*, *font*, *stop*, *gosh*, *lot*. What will happen when you kick your *a* in the butt with a final *r*? It will naturally do what *r* normally does to a short *o* sound—make it a long *o*, as in *fond*, *for*, *fore*, *orb*, *lord*, *pork*, *form*, *born* and *sport*. Thus, we get *wad–war*, *wand–ward* and *want–wart*. So *quark* rhymes with *fork*, just as Mermin said in the first place.

MARGARET M. BISHOP
Sunnyvale, California
1/94

I wonder if David Mermin can shed some light on the following mysterious e-mail misdirected to this college:

> The quarrel is easily settled by adopting the family name of qu$rk and naming the six members of this family as follows:
>
> quark, as in Mark, Muster—Fowls, *up*!
>
> querk, as in stairc(ase)—*down* the dark winding
>
> quirk, as in Kirk—life, Jim, but not as we know it—*strange*
>
> quork, as in pork—barrel *bottom* of
>
> qu▼urk, as in Newark—discrete *charm* of
>
> quyrk, as in beerc(an)—can't think of any connection off the *top* of my head, couldn't you just settle for five?
>
> sincerely,
> jjoyce@othersideofthewake

IGGY MCGOVERN
Trinity College
Dublin, Ireland
1/94

David Mermin gave a most interesting account of his attempts to find the correct pronunciation for *quark*. His quest to find other words with similar letter construction, however, seems to have failed to resolve the dilemma. I would like to suggest that he approach the problem from a different direction.

The pronunciation of the word *bow* depends on the meaning and will rhyme with *cow* or *bough* for the front end of a boat or a greeting to a noble person, or with *so* or *sew* for the instrument that projects arrows or an adornment for the hair. Thus perhaps we should be looking for the differences in *meaning* between the *pork* quark and the *park* quark to decide which pronunciation should be used. It might be, for example, that the former is to be used when seeking US funding, while the other should be used for esoteric games to be played way out in left field!

MALCOLM HARVEY
Atomic Energy of Canada Limited
Chalk River, Ontario, Canada
1/94

Will you permit someone who is not a native speaker of English, and who is teased by his (native speaker) wife for his inability to distinguish between the pronunciations of *golf* and *gulf*, to comment on David Mermin's December 1993 Reference Frame column? Mermin is known to leave his beloved Ithaca, New York, only infrequently and reluctantly. Obviously, however, he has ventured as far as New Jersey, for he knows that the name of the state's largest city, Newark, is pronounced in agreement with his *warx* rule. If he would travel just one state southward, he would come to another Newark, home of the University of Delaware, which, one is often reminded by its natives, carries the accent on the last syllable and rhymes with *park*, in apparent violation of the *warx* rule. How about that, David?

EUGEN MERZBACHER
University of North Carolina,
Chapel Hill
1/94

Mermin claims you miss the mark
If you insist on saying *quark*,
Though I confess that I would gawk
At anyone who calls it *quork*.
In either case I cannot pretenda
The problem's high on my agenda.

DANIEL KLEPPNER
Massachusetts Institute of Technology
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1/94

MERMIN REPLIES: I was flooded with mail, digital and analog, in the months following the appearance of my quark column. The preceding letters give a fair sampling of the issues.

Finnegans Wake. At the outset I explicitly excluded the question of the pronunciation of *quark* in Irish English, a dialect I admire but do not speak. I listed several reasons for limiting my analysis to the American dialect, though I failed to specify *which* American dialect. I meant, of course, the standard dialect intoned by network TV announcers, and not, as one correspondent reminded me, the language of those remote pockets where *pork* rhymes with *poke*. No less a native speaker of standard American English than Murray Gell-Mann remarks in his recent book of ruminations, *The Quark and the Jaguar* (Freeman, 1994), that he knew the thing should be a *quark*, rhyming with *pork*, before he ever came across the term in Joyce. Muster Mark and all those noisy birds (*moykle ahoyk-*

ling!) are quite beside the point.

Counterexamples. I have been sent many spurious counterexamples, with the *ar* either unaccented or followed by a vowel or a second *r*. Only slightly more to the point, I have been told of the villages of Warkentin, Warkton and even simple Wark, all, unfortunately, in lands where they do not speak standard American. A dozen people have brought Newark, Delaware, to my attention. Fortunately my colleague Barbara Cooper was born and raised there. "Where were you born and raised?" I asked her. "NEWark," she replied. "Where?" I pressed. "NEWark," she maintained, clearly rhyming the clearly *unaccented* second syllable with *ark*. Only one counterexample has caused me concern: *Edwardian*. I admit to always having pronounced it to rhyme with *card*. All my English friends claim it rhymes with *ward*, but by my own rules their opinions don't count. Most Americans never utter the term at all. Until somebody convinces me otherwise, I'm adding it to the list of words I've somehow managed to mispronounce all my life. Should this position become untenable I plan to fall back on the fact that proper names are notorious for defying general rules.

Quarks as boojums. For more on the subject than he could have dreamt of, I refer Carsten M. Haaland to chapter 1 of my book *Boojums All the Way Through* (Cambridge University Press, 1990). While the phenomenon of confinement might suggest that quarks do indeed qualify as boojums, closer inspection reveals that quarks are confined to remain near each other, while boojums are confined to remain near the surface of the helium-3 drop or, in more recent reports, the nematic bubble. This is a pity, since the hunting of the Snark can easily be read as a prophetic vision of things to come. The man who announces the arrival at "just the place for a Snark" is called Bell-Man, and three is taken early on as the number to reason about. My own *Hunting of the Quark* (unpublished) ends with the shattering revelation that the Quark is a Boson, an altogether more alarming denouement.

Expert opinion. I thank Margaret M. Bishop for endorsing my analysis. I have also had an encouraging correspondence with Geoffrey K. Pullum, a linguist in the distinguished department at the University of California, Santa Cruz, who commended the way I marshaled the evidence. "It was when you discovered rule interaction . . . that I realized I was dealing with someone who could have been a phonological theorist," he added. "Too bad physics snapped you up."

On the other hand I recently ran into V. F. Weisskopf at a reception in Ithaca. "I thought your last column in PHYSICS TODAY was silly," he said, drawing out the last word into a verbal stiletto.

"Well," I stammered, "an eminent linguist wrote me to say that my methodology was remarkable for an amateur."

"Linguistics," said Viki, "is also silly."

N. DAVID MERMIN
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7/94

Photovoltaics' Promise Still Less Than Sunny?

We read Jack L. Stone's well-written article "Photovoltaics: Unlimited Electrical Energy from the Sun" (September 1993, page 22) with much interest. Having been both advocates and critics of solar energy over the past 20 years, we believe Stone overlooked an important point. He implies that solar energy only needs to compete 1:1 against the consumer price of energy from fossil or nuclear power plants. Unfortunately, this does not recognize an important economic fact of life: A standby power generator is required for any intermittent power producer controlled by externalities.

Solar energy, operating only during bright daylight hours, requires a standby fossil, nuclear or hydropower plant in the power grid. The alternative of scaling back demand ("gray-out") on cloudy days or at night is hardly acceptable in a modern competitive society. A very large-capacity energy storage subsystem could in theory span conceivable periods of bad weather, but at considerable added cost. Storage to back up the solar component would need to hold several days of reserve power at a minimum. If solar power were eventually to replace fossil fuels (because of depleted resources or "greenhouse" pollution) or nuclear power (because of waste products or safety concerns), the combined output of wind, wave and solar energies would leave an industrial society at great risk unless energy storage were sufficient to bridge a potentially immense demand gap. Hydro-storage dams would be inadequate and are socially unacceptable. Batteries are expensive and have too short a deep-discharge lifetime. Exotic energy storage concepts such as chemical storage in a reversible storable cycle (granular aluminum), fly-

continued on page 127