

NIGHT THOUGHTS ON THE NSF

Daniel Kleppner

Like many of my friends who depend on the National Science Foundation for their primary research support, from time to time I spend sleepless nights wondering how to keep my research going. After an hour or so of mulling over seemingly insolvable problems my mind becomes confused. Visions nudge reality; odd bits of ancient lore—mostly fragments of Victorian novels and scenes from 1930s movies—intrude.

I am in a London poorhouse and Mr. Micawber is explaining to young David Copperfield that for a family that needs 20 pounds a year, an income of 20 pounds 1 shilling is bliss but an income of 19 pounds 19 shillings is misery. The scene dissolves into the US House of Representatives. It is January 1987 and President Reagan's voice echoes in the hall. He is instructing Congress to double the NSF budget. The vision fades and I see a frayed line drooping from 1987 to 1990. It is the budget line of NSF's directorate for math and physical sciences. The line sags below inflation: Our scientific income has dwindled to far less than 20 pounds a year. From the distance I hear Micawber weeping.

I toss and turn, trying to figure out how to get my hands on a \$150K laser. Set aside \$15K a year for 10 years? Can I stretch out my research project for 10 years more? Can my graduate student wait a decade? Will he become my graduate student *emeritus*? A graveyard drifts into view and on a tombstone

these words are inscribed:

DAVID COPPERFIELD, PhD
(POSTHUMOUS)

I am fired with rage. I must march to the NSF and demand a laser now.

I am Oliver Twist and I tremble as I shuffle down the aisle of the NSF orphanage, my empty soup bowl up-lifted. The youngest orphans stare at me. They have no bowls, for they have never received NSF support, but their eyes are bright with longing. Many orphans grasp bowls with cracks and holes: It has been years since those bowls were full. Some search in confusion for their bowls, but they cannot find them because their support has been suspended. Others stare in disbelief at bowls that were smashed because their support was terminated. Among the throng I spy the shocked and bewildered faces of scientific luminaries, prizewinners, even Nobel laureates. I raise my bowl to the Director and in a trembling voice ask, "Please, sir, one little laser."

"What!" he thunders. "You have already had more than your share. Out!"

I flee in terror.

As I run down the street the clouds part to reveal a bejeweled palace at the peak of a mountain. I am wearing a pith helmet and jodhpurs. I am Ronald Colman and I am filled with joy because I am climbing to Shangri-La. The palace glistens with prisms, diffraction gratings and optical components of marvelous beauty. Inside, I know, are enormous galleries filled with lasers and other exquisite apparatus. Over the palace flutters a silken banner emblazoned with

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But as I stare the shimmering palace wavers and evaporates. My spirit sinks as my heart recognizes a bitter truth: To acquire a laser I must prepare a fresh proposal.

Shadows flicker as Igor limps down the stone stairway to the subterranean chamber. His good arm holds high a torch. Igor shoves aside the oaken door, shuffles across the shadowy room and gazes at an antique shelf lined with leather-bound volumes. With difficulty, he makes out the gilt lettering on the spines of the ancient books: *The Collected Proposals of Dr. Frankenstein-Kleppner*. He pulls out one of the moldering volumes and makes his way back. Upstairs, rain beats against the panes of my study. Lightning flashes. Igor thrusts the tome onto my desk and slinks away. "Not again," I moan, "not again!" But I am resolute. I leaf through the mildewed pages, meditating on pain—the pain that I must inflict on my reviewers and the pain that they will inflict on me with proposals of their own. A strategy takes shape and my hand starts to write:

TITLE: *An Experimental Investigation of the Integers*

ABSTRACT: We propose a program to measure the integers by microwave spectroscopy of highly excited states of hydrogen, using the celebrated Bohr formula.

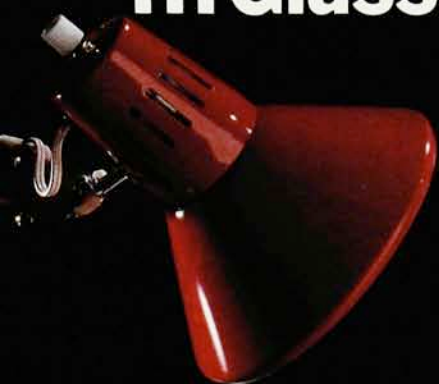
BACKGROUND: Integers are used throughout physics—their importance in quantum theory can hardly be overestimated—and they are fundamental to number theory and other important areas of mathematics.

"Good, good," I think. "Interdisciplinary research is the order of the day."

To our knowledge, however, the integers have never been put on a firm experimental basis.

Daniel Kleppner is the Lester Wolfe Professor of Physics and associate director of the Research Laboratory of Electronics at MIT. His research is in atomic physics. Among the committees on which he has served is the NSF advisory committee for physics.

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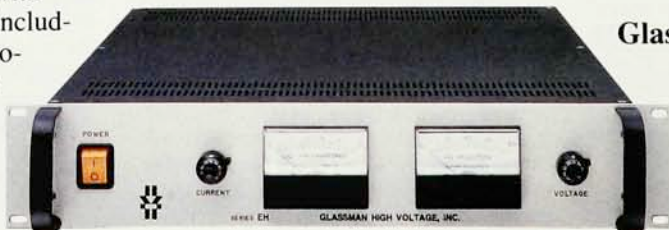


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A woman's voice whispers to me. It is a throaty, Russian-sounding voice. It is the voice of Greta Garbo in *Ninotchka*. "Comrade, do not be selfish. You must think of the gutt of the nation."

Furthermore, integers are essential to the functioning of the economy and a vital ingredient in any scenario for maintaining our economic competitiveness.

"Fool!" she interrupts. "Do you not know zat 'industrial competitiveness' was last year's vord? Zis year's vord is 'education.' I waste no time on fool. Vorewell!" I sigh and plod on with my writing.

In addition, with the resurgence of interest in primary education in mathematics it is more than ever essential that our understanding of the integers be on a firm foundation, experimental as well as theoretical.

(Perhaps I can make a tie-in with "Sesame Street.")

I am transported to NSF headquarters, the completed proposal in my arms. From far down the corridor I hear the sounds of running feet. I make out a figure from *Alice in Wonderland*. It is the Red Queen. She is running from me as fast as she can, but nevertheless she keeps approaching.

"What are the chances for my proposal?" I ask as she draws near.

"Excellent!" she cries to me over her shoulder. "There is a special initiative in your area this year."

I am elated. "How much are we up?" I ask.

"Zero!" she exclaims. "Minus four percent if you count inflation."

"But how can we be up if we're down?" I ask.

"Easy," she says. "All the other physics programs are down even more."

"I don't understand," I cry as, now running toward me, she starts to recede.

"It's simple," she calls to me. "At NSF a special initiative in physics means not having your budget cut as much as it would be otherwise. I just love this place." she adds. "In *Wonderland* when you run as fast as you can you stay where you are, but at NSF when you run as fast as you can you actually go backwards."

"That's complete nonsense!" I yell.

As she disappears backwards through the doors at the end of the corridor, the doors to the Director's office, I hear her final words: "It certainly is."

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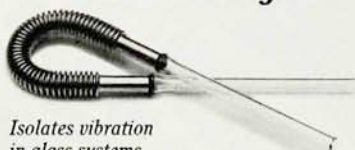
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