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Science and Writing, or, Physics is Language

A manifesto or something by Andrew Russ.

A statement in science does not become a fact until it is accepted as such by the community of scientists. In order for a fact to get accepted, it has to be communicated from (by) the scientist that discovers it to the other scientists who verify it, either through replication of the experiment or derivation, or by some other evaluation procedure. Thus the scientific method is constrained by the limits of our ability to communicate. Thus to fully understand science, one must understand and study communication.

One can even go a step further and argue that at its heart science is a communicative process. It is the job of the scientist to find the language to describe a subject as exactly as possible (quantitative description is generally preferred). As stated, this is precisely the task of any writer, to find the language to describe the subject at hand. What makes science different from fiction is that the subject in science is generally known to some extent beforehand; that the description of the phenomenon needs to match up, where appropriate, with other descriptions in science; and that the subject is somehow novel (i.e. in some aspect(s) the subject is not known beforehand). There is also less premium placed on the originality of the scientific language and more on its clarity and compatibility.

If science requires the development of an appropriate language, it is legitimate to enquire to what extent the limitations of language in turn limit science. And thus the study of language and its extensions is relevant to characterizing science. These studies include linguistics, information theory, coding theory, semiotics, semantics, logic, and even overlapping areas of psychology, philosophy, and history.

The diffuse (and multidisciplinary) character of the study of language implies a diffuse character to its use in the study of science. This is over and above, though perhaps not entirely distinct from, existing notions of the history, philosophy, and sociology of science.

Of course the use of the term "language" in relationship to science does not mean merely the language we form of written and spoken words, but encompasses all forms of symbolic communication and all semiotic technologies used in the sciences: mathematics, diagrams, graphs, gestures, citations.

To what extent do limitations of language constrain the development of a science? Conversely, to what extent can real progress in science (particularly in theoretical science) be traced to the application of new semiotic solutions to descriptive problems?

Does semiotic technology matter? Try to imagine doing all physics without vectors. By devising a better method of writing down and solving the equations used in quantum electrodynamics, Richard Feynman cut the time for computing a cross section from days to minutes. Consequently QED became accessible to a great many more physicists, and Feynman diagrams became the favored language of high energy physics.

How much of learning science is learning the language of science (the public knowledge), versus how much is learning the practice of science (the private knowledge)?

Can the practice or education of science be improved by acknowledging the importance of communication? For instance is the arbitrary character of definitional statements too often forgotten when presuming that a definition of a quantity is "obvious"?

To what extent is the learning of problem solving in physics a matter of learning to translate the words of verbal language into elements of a diagram into the symbols of mathematics? Can characterizing the process as one of translation make the learning process easier and more successful?

A great number of theories are created by analogy. The language of renormalization was borrowed from statistical dynamics for use in particle theory. Computations in particle physics were borrowed back for statistical physics. The foundation of the progress in chaos was the application of those ideas to certain kinds of classical systems. The analogies physicists make are explicit and detailed. How do they compare with everyday and literary analogies such as metaphor and simile? What role, if any, does (cont.)
If scientific language is semiotically less complicated by virtue of having fewer layers of meaning (metaphor), can it provide a useful simple case for the construction of a better theory of semiotics? Does the integration of multiple symbol systems (e.g. the presence of language, mathematics, and graphs in the same scientific paper) present special problems that make this task more difficult?

The process of discovery generally lies outside the scope of this approach to the study of science. But the formulation of the research question emerges from an understanding of past and present study in the area, understanding that comes from readings and discussions of texts. How clearly can this boundary be demarcated?

Links:

Science as Culture, a journal that publishes some interesting articles in this area from time to time. At this site you can see some past and potential future articles.

Some readings of interest:

Journal of Technical Writing and Communication

Configurations: A Journal of Literature, Science, and Technology sometimes has very relevant articles.

Charles Bazerman, Shaping Written Knowledge. For me this was a seminal collection of papers. Some are fairly historical, others more contemporary. Look at "What Written Knowledge Does" in the first section and the entire third and fifth sections. The whole book is interesting.

John Ziman, Public Knowledge. As contrasted to Michael Polanyi's Private Knowledge; one of the earliest books to recognize the fundamental importance of communication in contemporary science. Written by a distinguished physicist.

Possibly of interest (i.e. future readings)

David Locke, Science as Writing.

Ludwik Fleck, Genesis and Development of a Scientific Fact. Written in 1935 (!).

Andrew Pickering, Constructing Quarks. An extended case history.

M. P. Crosland, Historical Studies in the Language of Chemistry. A Dover reprint of a 1962 volume. A history of chemical symbols and nomenclature. Anybody know a similar work on physics?

Saff and Snyder, Vectors, has an interesting short appendix on the history of vector notation. The long debate in Nature between J. W. Gibbs and Oliver Heaviside on one side and P. G. Tait and his allies on the other is an interesting case history. Though I haven't found much on the adoption of vectors into the undergraduate curriculum.

One of my own writings

A paper I delivered at the 1994 Society for Literature and Science conference on a simple physics problem and answer analyzed as a solution to a communication problem.
T. Anders Carson's poems in his chapbook collection *Salt Pork and Sunsets* reflect the restlessness of a caustic traveller of the world and the mind and the tender musings of a caring friend. This collection contains several vivid poems about specific places in the world in which Carson describes the inhabitants, history and current state of affairs. In the poem "Foraging Floridians," Carson piles one tacky image upon another as if this state is a junk heap. In "Yellow Vienna," he writes

> Cut the farts Vienna.  
> We know of your waltzes.  
> We know of the youth  
> injecting smack at clubs  
> on the U4 line.  
> We know of the Eastern prostitutes  
> making geld  
> on the Ring doing the two-step  
> on frosty nights.

Less than enamored with many of these places he has visited and known, Carson's tone changes somewhat when he moves away from the glamorous and the romantic spots to the more conventional, as in the poem "I'm Not in Paris." In the poem "The Beach," Carson's mood is one of fondness and nostalgia amidst both the exotic and the familiar.

> In Kenya,  
> I basked in the sun and  
> almost drowned snorkeling  
> had it not been for Timothy's  
> strong strokes.  
> I respectfully watched the waves  
> of the Pacific as they  
> carried away feelings of discontent.

Another poem in this collection portrays a quieter and kinder T. Anders Carson. In "She Sleeps by My Side," he deftly describes how he and his beloved's lives, between her academic studies and his writing and housekeeping, mesh.

Yet, when Carson turns his eye upon his struggles concerning his own inner pain and the turmoil of his feelings toward his family, again the images become incisive and stark. The poem "Freshly Picked Scabs" declares

> It can only hold so much blood.  
> I pick furiously trying to  
> stop the battled scar that covers  
> up the evil chants  
> inside my flesh.

And when the collection ends with the poem "Arguing Over Sanity," Carson gives a glimpse into the sources of his confusion and concern. At this point we realize that it is his writing, his other "voice," that is his source of strength as a human being in this life where his dying father's words were, "My mouth will get me into trouble." Carson responds with
each sounding's its answer
by Stephen Jama

Editors' Note: Kent State University published the broadside poem, “each sounding’s its answer,” as a tribute to the students killed on the KSU campus on the 25th anniversary of their death.

for J.B. Kennedy & Robert Duncan & other natives of this world & shaping it as it is

openings: one year/the next

now the creek’s calm daffodils quickens yellow
again soon wild mustard still
too filling thick & sudden
bamboo groves &

golden spikes rocks
boulders erratic blackened
branches brittle

three red-tail hawks scree thru a canopy of unburnt oaks
thru a net of tree frogs of owls

withered reachings sun-laced slopings

two crows at road’s shoulder

shadows hold attention motionless

(beneath the flesh skeleton shapes) shadows
lifting another scree another

morning wind begins light
slides down slow & hillside
green patches thru charred

sharp-leafed yucca scattered tall ascending
white puffs etched palpable gracing steady

this scarred red barn of a house
this water’s edge all here: closings/openings

Stephen Jama received a B.A. in psychology and an M.A. in English from Kent State University. He taught English at Kent State and at El Camino College. In addition, he taught courses in rock lyrics/poetry, Zen poetry, creative writing as well as in James Joyce and William Carlos Williams in various "free" universities. He has been actively involved in anti-war and draft resistance activities and in free speech, the women's and black movements and sexual liberation activities.

Mr. Jama's poetry has appeared in the magazines BLIND DATE, NEW MORNING, DOMINGUEZ, CATHEXIS, ASPHODEL, and in a festchrift for Jim Lowell. Two chapbooks were published by Ariel; and Richard Bigus of Labyrinth Editions published his chapbook, "CURRENTLY."
On board the Lisa Marie jet for a tour of what Elvis called his Graceland In The Sky, I couldn't help but think of my uncle who wanted to be a pilot for United Airlines. He always dreamt of flying one of those big jets from Cleveland to Hawaii everyday, ever since he saw Elvis in Blue Hawaii. My uncle wound up driving bus for Greyhound after failing pilot school. I used to imagine him driving a bus load of passengers from Cleveland to San Diego, pulling over at the coast, gazing out over the Pacific, picturing Hawaii hundreds of miles away, beaches full of airline pilots reclining with pina coladas and cheeseburgers. San Diego is about as close to Hawaii a Greyhound Bus could ever hope to get. My uncle died a sick, bitter man, having to drive from Cleveland to San Diego everyday, the bus never lifting off the ground, no pretty stewardesses pacing up and down aisles handing out peanuts and pillows. He would have loved the Lisa Marie jet, "Wow, this sure is classsey," he'd say, sitting down in the pilot's seat. "You know, those airline pilots all think they're such hot shit! I could've flown one of these things, no problem! Those fucking pilots are nothing more than glorified bus drivers if you ask me! I don't know who they think they're kidding!? Sons of bitches!"

2 HOLY CITIES OF AMERICA

Democracy (another kind of Rock and Roll) began in Philadelphia. Rock and Roll (another kind of Democracy) began in Memphis. Benjamin Franklin and Elvis Presley, two great leaders in the rhythm of freedom, never met, due to the technicality that Benjamin Franklin died 145 years before the birth of Elvis Presley. This should not however prevent us from delighting in the assumption that if Benjamin Franklin had survived the two would have become fast and loyal friends. Benjamin Franklin would have no doubt been a regular at Graceland for suppers, bouncing little Lisa Marie on his two hundred year old knee, telling gossip about George Washington and that insufferable prick John Adams. Elvis would have taught the old man a few dance steps to drive the women crazy, then taken him out to the firing range to shoot targets of King George and his British Red Coats for old times sake. Oh those would have been great times, would have made some great American portraits, two American father's of Liberation.

---Isabelle Eberhardt, “The Magician”
I can't sit in silence
and creep through life
unresolved.
Resounding that pounding
intuition rolls through
knolls of slight anxiety.
I worry over my brother's
constant love affair with
the other side of death.
If not courted properly,
burial chambers will
remain as empty
as the church poor box.
Everything's been collected,
pit in jars
and dissected to understand
its resistance to our force.

Observing how this poet struggles to strike accord with the world and what he finds in it, I found in this collection of poems a kindred spirit. I think that Carson's sensitive and discerning nature often keeps him at arm's length from people and places. This keeping the world at bay, however, allows him the freedom to bite through any distaste and pretense he feels in encounters. Conversely, with persons and places for whom Carson has warm feelings, and with whom he strives to maintain understanding, his wit softens. In this he is not so different from most people. The difference with this poet is that it is in his writing that he aims for balance and clarity, and it is there that he finds strength; his pen, yielding as a friend, is also his sword.

Maureen Neville
October, 1998

AN AUTOBIOGRAPHICAL NOTE FROM T. ANDERS CARSON
I was orphaned young. It has given me a view of life through a different shred of skin... I had a predominantly Swedish upbringing. Synonymous with this is that entire "freedom through obedience" syndrome that many of Scandinavian descent find hard to spit beyond. After my mother's successful suicide, I opted to write from that dark place.
I have poems forthcoming in Atom Mind (US) Journal of Contemporary Anglo-Scandinavian Poetry (UK) and Slipstream (US). Thank you for giving international poets a chance to be heard.
ANTI-TECHNOLOGY: HOW "VIRTUAL" CAN IT GET?

People rave now about their "virtual communities," the ones they find online. But virtual people are not there when your house burns down. Virtual people do not share physical space and eye contact. Virtual people do not have to like each other. In our life, if you really want to live in a community with other people, you have to accept them. And that commitment and accountability is necessary, because I think anything that takes us away from being present here in the real world is a real danger. Television. Computers. Long commutes. To opt out. People in virtual communities get to know each other as disembodied brains.

—SCOTT SAVAGE, born in 1959, is the editor and publisher of "Plain" magazine.

Submitted by Katherine Donithorne in response to news that Bern is on website.

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from Monica Lewinsky, *All of Us Want Yours*, by Bern Porter

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