Stealing the Fire

A Linguistic Overview of This Century's Advances in Physics

[speaker's notes]

by Dan Moonhawk Alford

given: AAA/SAC March 25, 1996

A. Introduction

What does Physics have to do with Linguistics and Anthropology?

> **Since my first talk at an American Anthropological Association meeting about 18 years ago, "The Origin of Speech in a Deep Structure of Psi," I have taken flack from my own linguistics colleagues, when noticed at all, for what they perceive as some kind of misplaced physics envy on my part. Perhaps even anthropologists here have thought the same.**
>
> **If we all stay in our nice, neat little academic boxes, we can continue going deeper and deeper into a single thing -- but we won't be a part of the move to hook up again, to bring things back together holistically. Like Benjamin Whorf, I have a long-running simultaneous interest in linguistics, modern physics, and Native America, all stretching back over 25 years.**
>
> **As with him, my interest in physics is simple: language and culture manifest in reality, so linguistics and anthropology must explain its concepts in terms of reality, even though it's the background. Over the 20th Century, our background has changed: physicists' conception of reality was transformed in profound ways. No longer are simple Newtonian particle explanations full and sufficient -- waves and fields and quantum realities must also be made available to the explanation.**
>
> **Most academics feel like learning their own field is tough enough, and to attempt to understand the likes of Einstein, and all that math ...! And with all these neat consciousness issues floating around -- what's a self-respecting anthropological consciousness researcher to do!**

The Dirty Little Secret: Stealing the Fire

> **Now I can finally tear the wraps off of a dirty little secret that not even physicists tell each other, so aweful is it to contemplate: physicists are knee-deep in linguist-envy! There is a long history of physists creeping into the camp of linguists when everyone's sleeping and stealing the fire. Whenever physicists are cooling down on new ideas, one of them steals into the linguists' camp to find inspiration.**

I'd like to present four brief but solid examples that have happened during this century. A warning for any linguists encountering this material: the following does not present our discipline in a rosy light, outright implying that the only reason physicists were able to steal fire from our camp was that we were sleeping and not paying attention to how valuable our gift was, letting it slip through our fingers and mix with our drool. If physics in this century is seen as the veritable Queen of Science, then linguistics has been the unwitting queenmaker.

B. Possible Prototype: Democritus

Where'd the notion of the atom come from?

Maybe I have five instances altogether -- or four and a half, actually, since I haven't been able to follow this one back as far as I like. McLuhan states in Understanding Media (1964, p86) that in ancient Greece, Democritus took the notion of "a-tom" from that of "letters", neither of which can be further divided.

Are letters the best for representing sound?

If indeed Democritus made this analogy thousands of years ago, his hidden assumption was that 'letters' were indeed the best way of representing sounds -- in naive (ordinary daily) physics, a sound is a 'thing' which can be represented by another 'thing', a letter.

It's interesting that the question is not closed -- that at the same time in this century that physicists started noticing that an atom was not really a 'thing' in the classical sense, but best described by the qualities of its vibrations, structural linguists also began noticing that, for certain purposes, a [b] sound is better described according to its bilabial, stop, and voiced qualities than by a discrete letter 'b'.

Here, then, is an example of the constant dialogue between language and reality. And the historical impetus is very strong: the sneaking suspicion that, as linguist Benjamin Lee Whorf put it, nature and language are inwardly akin.

C. First Incident: Heisenberg's Lament

Describing the Subatomic Realm

"Common sense" tells most people that describing the inner structure of an atom is a physics problem pure and simple -- however it is, more fundamentally, a linguistics problem, one of effing the ineffable.

But let's step back from our introduced word-trance called 'a-tom' for a moment and consider what Werner Heisenberg faced early in this century as a quantum pioneer: Although the atom has been considered the

smallest 'thing' because it can be divided, the atom actually exists entirely in its radiations, and there is no 'thing' there radiating.

Although physicists talk about 'electron-s', the plural is imaginary since one electron is indistinguishable from another -- in fact, we still don't know a century later whether there is just One Electron in gazilllions of manifestations or actually gazillions of electrons. In such situations, then, fundamental scientific terms like 'same' and 'different' lose all meaning because neither imparts any real information.

The Atom as a Linguistic Construct

This is in part what led Heisenberg to proclaim that "We have reached the limits of our language" and to explain: "The problems of language here are really serious. We wish to speak in some way about the structure of atoms.... But we cannot speak of atoms in ordinary language."

Language is discrimination and discrimination is meaning. If you can't discriminate between two electrons, then there is no meaning in words ascribed to their difference.

The toughest part about describing the atom, in other words, is conceptualizing it within ordinary, noun-oriented Western languages suited best to talking about 'things', since there are no 'things' in the subatomic realm.

So How Do Physicists 'See Into' the Subatomic Realm?

They don't. They 'feel' their way into it with mathematics, a relationship language rather than a 'thing' language. A language for which meaning derives from relationships rather than from individual properties is, as you may now see, just right for describing a realm with no individual things.

And a grand methodology begins to emerge: when the phenomena being studied are of such characteristics that the language you are using no longer describes the phenomena effectively -- CHANGE THE LANGUAGE! And that sets us up for the next incident of fire- stealing

.

D. Second Incident: Einstein's Relativity

Staking the Claim on Relativity

Who was on first? The Relativity of Language, under various names, has been around for nearly four hundred years in Germanic linguistic thought, as I laid out in a 1980 Phoenix article called "A Hidden Cycle in the History of Linguistics," involving the likes of Locke, Leibnitz, Kant and von Humboldt, who in the early 1800s synthesized much that had gone on before. He said, "Each language sets certain limits to the spirit of those who speak it; it assumes a certain direction and, by doing so, excludes many others."

Relativity had been around for nearly three hundred years before Heisenberg and Einstein heard of it in their Humboldtian educational training in Germany, and even in physics it is still about language, though mathematical languages like Euclidean geometry instead of full-blown human languages -- a special case of language, you might say. In light of the crucial role given to language by Heisenberg above, a fundamental principle had to be established in order for work in physics to proceed. The language you use gives a limit to what you can describe.

Where'd Einstein get it from?

Recent chatter on the Linguist-List about Saussure revealed a crucial fact, a mystery figure heretofore overlooked: Jost Winteler. Jost was a Germanic trained linguist at the University of Geneva, Switzerland, while Einstein was a graduate student there; they even shared a rooming house together; and to top it off, Einstein in his later years referred many times to this Germanic linguist, crediting him as the source of many of Al's most important ideas. Compare to the previous Humboldt statement one made by Albert Einstein in a 1941 radio speech, showing that he understood the anciently made connection between language and thinking: "What is it that brings about such an ultimate connection between language and thinking? ...the mental development of the individual and his way of forming concepts depend to a high degree upon language. This makes us realize to what extent the same language means the same mentality."

What did Einstein do with it once he had it?

Linguistic relativity has always been about how a certain style of thinking flows from the structure of a language. Einstein narrowed this to Geometry in order to prove to science that Euclidean Geometry, while a perfect language for describing and manipulating objects on flat surfaces, was insufficient for describing curved spacetime -- for that a different language, a non-Euclidean Geometry, was needed. Euclidean Geometry had mostly been taken as "intuitively" "true" for describing the universe; Einstein showed it was neither intuitive nor true, just efficient for plane surfaces -- that each way contained a relative truth, different in different contexts.

In a way, while Heisenberg opened the question and pointed out the absolute necessity of doing something about it quickly, Einstein pointed out a direction for people to go -- change the language being used for research and description when the occasion warrants it.

As Whorf later stated, "A change in language can transform our appreciation of the cosmos." Because of this fire-stealing, Einstein changed the world in an irrevocable way for us all.

Did Whorf know Einstein? It would be too neat, wouldn't it? I've wondered myself for 25 years -- and just within this past month I have been informed that Einstein and Whorf indeed had at least one face-to-face conversation with each other. I'm still hot on the trail of this one.

Was Whorf's Relativity Really Like Einstein's?

As I nailed down in a 1982 article called "Is Whorf's Relativity Einstein's Relativity?", where I pointed out even similarities of wording -- yes. It is clear that Whorf, who was trained as a chemical engineer at MIT and had also gotten Humboldtian linguistics training through Edward Sapir at Yale, understood that Einstein was coopting the concept for physics and that somebody needed to bring this principle, newly validated in its special case within physics, back out into the linguistics world -- where, I assume, he expected it to be greeted with similar praise for its applicability to human languages and issues of thinking.

Perhaps it's just as well Whorf died young so that he didn't have to endure personally what happened to his ideas. The Whorf Hypothesis Hoax perpetrated by academics effectively prevented generations of grad students from reading Whorf and realizing that the so-called scientific foundation of the social sciences had crumbled. While Einstein's version led to nuclear weapons, Whorf's led to perhaps the most interminable squabble ever seen in halls of academe.

Hopi Physicists?

One of Whorf's most astounding predictions, to some, but which grew out of his research, was that the Hopi language was closer to the language of quantum reality than are Western languages -- that their own native cultural physics passed down through the language was closer to quantum than Newtonian reality. He wondered at the insights a Hopi speaker might have if trained in Western physics. I believe there is such a person practicing physics currently, but as yet I have no research to add here.

What I do want to emphasize, however, is the mathematical quality of Native American languages that Whorf was pointing to. A colleague once chided me for being credulous when I talked about Native American languages being better suited for quantum physics than our own. After all, sez he, our own physicists utilize an ancient tradition of mathematics -- which we don't see in Native America, now do we?

But let's back up: WHY do our physicists need to use mathematical languages in order to conceptualize the quantum realm? Because there are no things there, and our languages need things in order to hang noun phrases on in order to make sense; we can't make or talk sense about the quantum realm in English, German, French, etc.

But mathematical languages do not have 'things' -- they are more verby, with processes and transformation in the foreground, so they can be used to deal with quantum concepts. And that's exactly what most Native American languages are structurally as well, except in a qualitative instead of quantitative way. So if they have that already as their daily language, perhaps they're not as deficient as my colleague believed.

E. Third Incident: Bohm's Implicate Order

An Innocent Beginning to a Detective Story

One day a few years ago, in an offhand way, I mentioned in a distributed email message that there was a great similarity between Whorf's terms 'manifesting' and 'manifested' in his description of Hopi cosmology and David Bohm's use of 'implicate' and 'explicate' in his book, Wholeness and the Implicate Order. Someone emailed me back and asked exactly how I thought they were similar -- it took me 6 months of diligent research to answer that one.

Did Bohm 'think up' the Implicate Order?

Although I do not have the time to lay out all the reasons and similarities here, such as both manifesting and implicate refer to a realm of verby processes and relationships where everything is interconnected, what's most important to explore is where Bohm got the idea in the first place of a conception of the universe that did not rest on our familiar Newtonian cornerstones of space and time. Only once to my knowledge was that ever described before, and that was by Whorf in "An American Indian Model of the Universe."

Did Bohm Read Whorf?

It was therefore with great trepidation and excitement that I met David Bohm a few months before his death. We were participants in a Dialogue between Western scientists, mostly from physics plus only two linguists, and representatives from Native America about how we conceptualize reality. Having only limited time to chat, I asked him point-blank whether he had read Whorf, to which he replied, "Oh, yes!" Over the next few years, the ramifications of that admission became clearer and clearer.

Why didn't Bohm cite his source?

Of course he had read Whorf, and he had reshaped Whorf's terms 'manifesting' and 'manifested' into more scientific-sounding terms, implicate/explicate, in order to see how the scientific community would react to a non-Newtonian conception of reality. And he followed well the insights of his colleague Einstein and Whorf by changing the terms, but he also did not bring a lot of attention to their source in Whorf -- why?

Well, why risk becoming embroiled in the academic firestorm which had been swirling around Whorf for decades already in the late '70s? Better to let the idea fly or crash on its own: and, the truth be known, it received much more positive treatment from academics than did the original by Whorf -- which had been by that time demoted from a principle to a hypothesis and then straight- jacketed in Newtonian assumptions by non-scientists who assumed that's what science was, thereby trivializing Whorf's insights into simplistically winnable logical arguments in English.

F. Fourth Incident: Bohmian Dialogue Validates Whorf

While the social sciences were deep in debate ...

> **In 1993 I delivered at the Spring Annual Conference a "Report on the Dialogue Between Western and Indigenous Scientists," which had been sponsored by the Fetzer Institute in Michigan. The Dialogue was -- and continues to be, as of the fifth one this past February -- about the kinds of issues I have outlined above, a convergence of language, physics, and Native America, and much more. [You may write for free transcripts of the 1st and 2nd Dialogues: Carol Hegedus, Fetzer Institute, 9292 West KL Ave, Kalamazoo MI 49009.]**
>
> **It is my own private theory that David Bohm, pleased with the reception of his Implicate notion by the academic world, was nonetheless now faced with a deeper question: given how shabbily academe had treated Benjamin Whorf, declaring his ideas including linguistic relativity wrong, was it possible that Whorf's description of Hopi cosmology was actually accurate? How could they receive such opposite treatments?**

Bohm validates Whorf's Linguistic Relativity Principle

> **My supposition continues that Bohm decided that the only way to find out if Whorf was right or not was to somehow figure out a way to talk to Native Americans about it. His own colleague and co- author David Peat was in America doing research for a book and had hooked up with the Fetzer Institute, and somehow it all came together that Bohm got his chance to find out personally.**
>
> **Three times they tried to sychronize with Indian time so that there were equivalent blank spaces on calendar slots for a meeting with select representatives of Native America, and finally on the fourth time it worked.**
>
> **Although no Hopis per se were present at the first Dialogue, plenty of Algonquian-language speakers were there, and when the topic of Whorf's conception of Hopi cosmology with its manifesting and manifested orders came up, representatives from Mikmaq, Cree and Blackfoot said that although they couldn't speak for the Hopis, that's the way THEY did it. In scientific terms, this is called 'independent verification,' since Whorf stated this only about the Hopis and never mentioned Algonquians in this regard. So while this does not 'prove' the Hopi point per se, what it does is point to a wide-spread areal feature covering many language families in the Americas that do exactly what Whorf said happens in Hopi -- a phenomenon even larger than Whorf knew at the time.**
>
> **And, more importantly, Western scientists at the Dialogue specifically stated their agreement with the Native Americans that their indigenous languages -- which they say they can normally speak all day long and not utter a single noun, which refer to relationships and processes rather than things -- are better suited than are our usual Western languages to talking**

about quantum reality, a realm indigenous peoples aren't even supposed to know about, much less claim to have thousands of years of experience with under a different name (more like 'animateness' or 'spirit').

Though most linguists were still sleeping, at least two were this time awake and participating as a century of fire-stealing came full circle.

G. Conclusion

Coming around full circle.

From Heisenberg's Lament that we have reached the limits of our language, to Einstein's validation of non-standard languages and clearing the way for exo-traditional views, to Whorf's suggestion that indigenous languages -- structured like a qualitative mathematics better suited to describing quantum physics -- was such a candidate for an exo-traditional language, to Bohm's final physical act of validating the insights of Heisenberg, Einstein and Whorf in one fell swoop, it is easy to see how linguistic physics has become during this century.

Linguistics as the premier model for science

Benjamin Whorf, as you can see, has influenced physics in this century much more than he did linguistics. He even in a way predicted the Fetzer Dialogues: "We all know now that the forces studied by physics, chemistry and biology are powerful and important. People generally do not yet know that the forces studied by linguistics are powerful and important, that its principles control every sort of agreement and understanding among human beings, and that sooner or later it will have to sit as judge while the other sciences bring their results to its court to inquire into what they mean." (p232)

What is this gift, this most valuable possession, that linguistics has, which is so prized by physicists? As a particle physicist once told me, "If physics had to deal with meaning as well as everything else it deals with, it could no longer be a science." Meaning. Whorf referred to "the quest for that golden something called meaning."

Language and culture have a unique status in research since the objects of their study exist both in 'outer' society and 'inside' the individual at the same time. As Heidegger said, we consitute our language while we encounter it already constituted.

Linguistics, unlike 'hard science', as that name implies, has always had to balance form and meaning in its equations -- and it is exactly the meaning part that other sciences are so envious of, and why they try to steal our fire. Western science has only awakened to the need for meaning during this century, while indigenous science has been aware of it for millennia -- it never went out of fashion.

Parting shot -- a Qualitative Interdisciplinary Equation

Finally, big picture time, I'd like to leave you with the following qualitative equation which ties together the above insights in our fragmented vocabularies: What linguists refer to as 'meaning,' physicists call 'quantum', and Native Americans call 'spirit' (and biologists call 'life,' and medicine calls 'health', etc.).

Since, as astronomer Sir James Jeans once said, the universe is looking less and less like a great machine and more and more like a great thought, today questions of meaning, consciousness, spirit and quantum realities are becoming the most scientific issues of all.
