

RESEARCH PARADIGMS AND LINGUISTIC RESEARCH¹

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*In the year sixteen hundred and nine
Science's light began to shine.
At Padua City, in a modest house
Galileo Galilei set out to prove
The sun is still, the earth is on the move.*

Bertolt Brecht, *The Life of Galileo*

The following papers (Derwing, Dobrovolsky, Guilfoyle, and Prideaux) began as a panel discussion at the annual Alberta Conference on Language (ACOL) held in Banff on November 7th, 1992². The general theme of the panel was *Research Paradigms and Linguistic Research*, and the original panel consisted of Bruce Derwing (U of A), John Archibald (U of C), John Ohala (U of A; Berkley), Eithne Guilfoyle (U of C), Gary Prideaux (U of A), and Michael Dobrovolsky (U of C). Each original talk was about fifteen minutes long.

In this paper, I would like to combine the very brief opening remarks that I made, as well as my contribution: research paradigms and language acquisition research.

1.0 OPENING REMARKS

I would like to begin by making some very general comments on the relationship between theory and research, and then give a few examples from fields other than linguistics.

In the philosophy or sociology of science, this question is usually addressed under the heading of *the construction of scientific knowledge*, or the question of *theory-driven* versus *theory-free* data collection. We will note that the question of whether theory-free data collection is desirable, or even possible, arises in the panel discussion following.

Throughout the history of science, we see examples of every possible type of interaction between scientific theory and research practice. Examples usually trotted out in favour of theory-

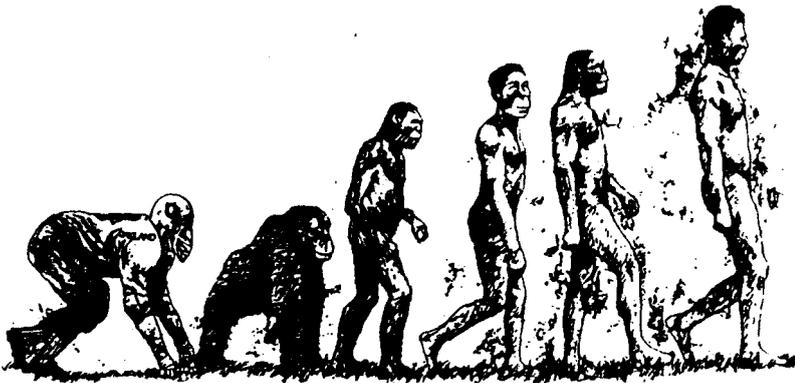
¹ I would like to thank Gary Libben for inviting me to organize this panel. I would also like to thank all of the original panel members for participating.

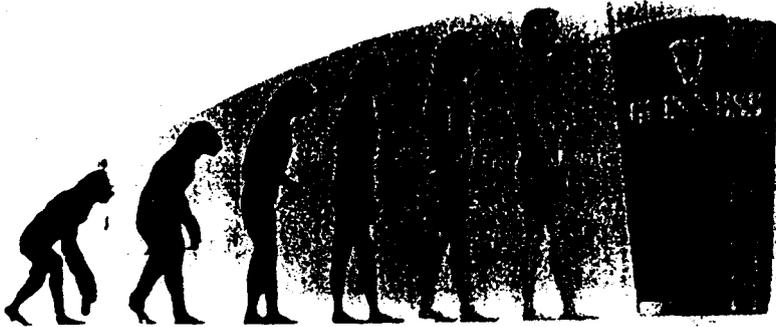
² Some attempt has been made to alter the style of a talk into that of a written paper, but the overall impression will remain informal.

driven data collection are cases where theory predicted certain phenomena which were then searched for and found. Voilà! The vindication of theory. Familiar examples of this are Mendel predicting the existence of a physical structure called a gene; Stephen Hawking predicting the existence of Black Holes; or the discovery of a particular sub-atomic particle. Sometimes the theory requires an independent empirical discovery before it becomes a feasible theory. This was the case with the theory of Continental Drift. It appeared to reconcile a number of diverse observations, but there also appeared to be no way that it could possibly happen. How could things as massive as continents move? Then the theory of Plate Tectonics was proposed and voilà! A mechanism for Continental Drift.

In the historical archives, we also see examples of the experimental paradigm triumphing over pure theory. The arguments that took place between Boyle and Hobbes over Boyle's air-pump experiments were consistently won by Boyle. Hobbes felt that such experiments as Boyle was conducting could not provide evidence that was relevant in any way to natural philosophy. Clearly, though, Boyle's experimental paradigm has influenced modern science greatly.

The final example I would like to present shows, I think, a much subtler relationship between theory and research. Considering our location today (in the Rocky Mountains), it is fitting that it concerns the analysis of the soft-bodied fossils found in the Burgess Shale (just down the road). A man named Charles Walcott was responsible for much of the original measurement and classification of the fossils in the early part of this century. Practically every measurement he made confirmed the predictions of the dominant view of evolution at the time. He made his measurements fit into existing categories. Jay Gould refers to this a *Walcott's Shoehorn*. His measurement and classification was biased by the dominant view of the progression of evolution: the cone of diversity. This view can be illustrated with the following pictures:





There are three major assumptions made here (beyond those made about football players and Guinness):

- (1) evolution proceeds by simple forms becoming complex (progress)
- (2) there was less diversity early in time than later
- (3) evolution proceeds gradually

By not questioning these three assumptions, Walcott's measurements supported the dominant view. Later in the 20th century, other paleontologists re-examined Walcott's work and the fossils of the Burgess Shale and radically revamped our view of life and evolutionary progress. They made the following claims:

- (1) diverse forms were present early; they did not necessarily arise from simpler ones
- (2) many of these forms were decimated
- (3) change is not necessarily gradual³; stasis is data

The point that I would like to draw from this fascinating study is that Walcott felt that he was engaged in theoretically-neutral activity; he thought he was *just measuring*. And yet, later re-analyses showed that his measurements were not neutral.

I would like to conclude this section with Geoff Pullum's view on the whole question. He says:

³ Referred to by Gould as evolution by jerks.

In this piece I rail against the tendency of linguists to write about the philosophy of science as applied to their subject instead of writing about what languages are like, which is what linguists are supposed to be good at . . . If one found one's Toyota repair mechanic writing analyses of Toyota repair argumentation instead of fixing the damn carburetor trouble, one would naturally and rightly get quite annoyed. And in the actual car repair world this does not happen. But try to keep linguists from philosophizing inexpertly about their craft when they ought to be practising it is like trying to keep a dog from barking at the mailman.

I hope the following papers will show why and how this *is* a fascinating area for linguists. Maybe we should have put a sign outside the room for Pullum: Beware of the Dog.

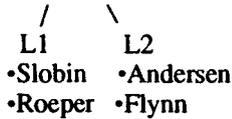
2.0 THEORY AND RESEARCH IN LANGUAGE ACQUISITION

I would now like to discuss the notions of theory and research in language acquisition (both first and second). There are many similarities in the types of research and the types of controversies that arise in the two fields.

Currently the theory that seems to be getting most of the attention in language acquisition is the Principles and Parameters model. Where the Principles are argued to be innate and hence common to all languages and the Parameters are underspecified rules that are triggered via interaction with the environment. Principles are meant to account for the similarities between all languages; parameters for the differences. This model has succeeded in making language acquisition research an integral part of linguistic theory by placing on the grammar that linguists propose the requirement that it be feasible or learnable. The "learnability" paradigm takes as its starting point an account of adult linguistic competence (usually framed within a GB model) and then attempts to account for how the learner acquires this system of knowledge. This can be contrasted with the traditional research paradigm in language acquisition that owes more to a Piagetian tradition than a Chomskyan. Figure #1 gives an astonishingly simplified account of these two schools.

Piagetians

- more concerned with developmental path & stages
- non-modular minds



Chomskyan

- more concerned with initial & final states
- modular minds

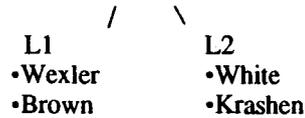


Figure 1: Piagetians and Chomskyan Schools of Thought

2.1 Theory Construction in Language Acquisition

So researchers differ in the phenomena they are trying to explain and in the assumptions they make regarding the mind. They also differ in their techniques of theory construction. Acquisition researchers fall into two camps on the matter of theory-driven versus theory-free data collection.

The first camp is what Rod Ellis (1986) calls the “Research-then-Theory” school of thought. By “research”, I think he means “data collection”. Researchers in this paradigm would argue that their data collection is theory-free. Data is collected (relevant to a particular phenomenon) and then the researcher attempts to construct a theory to explain the patterns found in the data. I have heard this viewpoint expressed by many a doctoral student in education when I asked what their thesis was about: they would answer, “I don’t know, I’m still collecting my data.” This is, of course, the method that has been referred to as “butterfly collecting” by an anonymous cynic. It has, however, been argued that when an academic discipline is in its infancy, then this *is* a useful manner, indeed the only manner, in which to proceed. But that once a critical amount of data has been collected, then a theory will be developed to account for the data. From then on, data-collection should be theory-driven.

This second stage, or second camp, is what Ellis calls the “Theory-then-Research” school of thought. Researchers in this paradigm draw freely on a particular theory and choose research questions which have the potential of informing the theory. Let me illustrate this school

⁴ Come to think of it, these arguments can apply equally to First Language Acquisition Research.

of thought with the following example from second language research:

2.2 Adult Access to UG

One of the questions that is attracting much attention in the SLA research field⁴ is whether adults have "access to UG". What this research seeks to determine is whether the interlanguage grammars of L2 learners are governed by the same principles as primary languages. In other words, do interlanguages violate proposed universals? This is, of course, an often controversial pastime as the arguments as to whether a particular feature of a language is universal or not, are heated and frequent. Person A will claim that certain L2 learners violate principle X or parameter Y. Then person B comes along and argues either:

- (1) that X isn't a principle, or
- (2) that Y isn't a parameter, or
- (3) that the violation is to be expected because A got the markedness facts wrong

At a time when linguistic theory (any model) is so fluid, the problems of applying this theory are myriad. This is particularly true of the *learnability* approach to acquisition. Rather than focussing on the developmental stages in a theory-neutral fashion, the researchers in this tradition attempt to account for the acquisition of linguistic structures claimed to be part of adult competence. For example, we see L1 acquisition articles on such things as:

- Acquisition of binding principles
- Children's knowledge of locality conditions
- The development of long-distance anaphora

And L2 acquisition articles on such things as:

- Parameter setting and the acquisition of word order in L2 French
- Minimal sonority distance and SLA
- SLA and governing categories
- Bounding nodes and subjacency violations

And, of course, people argue about the linguistic descriptions of these phenomena. But I don't feel that the controversy over the formulation of the theory is a Bad Thing. We have to accept a complex model of *what* is being acquired before we can talk about *how* it is being acquired. And, as in other scientific fields, it takes time, argument, and controversy to establish consensus. It can take a very long time, as I noted this week, that the Catholic church has just pardoned Galileo.

3.0 HIERARCHICAL REDUCTIONISM

I think that one thing that characterizes all types of applied research is the adoption of a principle of *Hierarchical Reductionism*. This is a principle adopted by many other branches of science. It assumes that one researcher is incapable of doing everything; some things have to be assumed. A particular researcher may be investigating the physical properties of ball-bearings in collision. It is unnecessary for that researcher to necessarily conduct basic research in:

- quantum mechanics
- soft-bodied objects
- string theory
- calculus
- probability theory

A particular piece of research can fill one part of a puzzle. My own work concerns the acquisition of stress in second language learners. Related questions might well be such things as:

- how is stress physically implemented?
- how is stress acoustically manifested?
- what is the theory of stress assignment?
- is it an aspect of lexical representation or lexical processing?
- is it the same at the word, phrase, sentence, text level?
- how do morphology, syntax, discourse, and phonetics influence stress?
- is it the same for L1 learners?
- etc.

I would argue that it is reasonable, and indeed necessary, to exclude certain types of questions from a particular research design. Hence the term *reductionism*. It is *hierarchical* in that a researcher is entitled to accept the research that has been done on either a higher or lower level from his or her own. So, I do not *need* to address philosophical questions like whether we

⁵ Thanks to Kevin Gregg for the example.

can know anything anyway, or physiological questions like the role of ion transfer in muscle contraction. It *may* become relevant but not necessarily.

The researcher is entitled to make certain assumptions. In many other disciplines, different perspectives on the same phenomenon are valued. We can find out interesting but different things about stomach troubles caused by overindulgence in alcohol from molecular biologists, and sociologists.⁵ People working on modelling cognition are entitled to accept research that was done of neuronal structure.

Work in language acquisition has often been criticised for this type of reductionism. I feel it is unjust. Yes, linguistic theory and language acquisition studies must interact. And it is not just that acquisition studies act as tests of particular linguistic theories. Within whatever framework we write our grammars, we want those grammars to be *learnable*; to be *feasible*. Acquisition requirements are now an integral constraint on what *linguists'* grammars can look like (they are obviously a constraint on what *learners'* grammars can look like).

4.0 CONCLUSION

In conclusion, I do feel that theory-driven data collection has a place in language acquisition studies. As I mentioned in my opening remarks, we have to be wary that our theory does not lead us to use, for example, a UG Shoehorn. All science is conducted within a social context. The myth of impartial scientific observation remains only in 1950's movies with sterile scientists in white coats. I would like to close with the words of Jay Gould:

We often think, naively, that missing data are the primary impediments to intellectual progress - just find the right facts and all problems will dissipate. But barriers are often deeper and more abstract in thought. We must have access to the right metaphor, not only to the requisite information. Revolutionary thinkers are not, primarily, gatherers of facts, but weavers of new intellectual structures.

The theory is a light that can blind or illuminate.

*Sixteen hundred and thirty-three till
Sixteen hundred forty-two
Galileo Galilei remains a prisoner of the Church
Up to the day of his death.*

Bertolt Brecht, *The Life of Galileo*

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