

ON THINKING LINGUISTICALLY

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Abstract:

Working over a period of three decades in diverse classroom settings, we have sought to introduce students to linguistics by engaging them in 'thinking linguistically' about knowledge of language. The work is centered on telling a connected story about language, constructed from problem sets that we have developed (Honda and O'Neil 2008) and from our students' own work. Our work integrates cooperative teaching and learning with a problem-set-based approach to linguistic inquiry in order to establish an intellectual climate in the classroom in which students at all levels can develop a scientific style of argumentation and an appreciation of the nature of scientific work. We present evidence in support of our belief that the questions that arise in linguistic inquiry represent a fruitful way to introduce students to scientific work on knowledge of language.

Keywords: problem sets, linguistic inquiry, knowledge of language, education, teaching

Resumo:

Trabalhando durante um período de três décadas em diversos ambientes de sala de aula, buscamos introduzir os alunos à linguística, envolvendo-os em “pensar linguisticamente” sobre o conhecimento da linguagem. O trabalho é centrado em contar uma história conectada sobre a linguagem, construída a partir de conjuntos de problemas que desenvolvemos (Honda e O'Neil 2008) e do próprio trabalho dos nossos alunos. Nosso trabalho integra o ensino e a aprendizagem cooperativos com uma abordagem baseada no problema da pesquisa linguística, a fim de estabelecer um clima intelectual na sala de aula, em que os alunos em todos os níveis possam desenvolver um estilo científico de argumentação e uma apreciação da natureza do trabalho científico. Apresentamos evidências em apoio à nossa crença de que as questões que surgem na investigação linguística representam uma forma frutífera de introduzir os alunos ao trabalho científico sobre o conhecimento da linguagem.

Palavras-chave: conjuntos de problemas, pesquisa linguística, conhecimento da linguagem,

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educação, ensino.

One afternoon when we were children, my sister and I were playing in the living room. I was ten years old at the time and she was four. In my usual, big-sister way, I was bossing her around, telling her to do this and do that. At some point, I made one demand too many—maybe I asked her to turn the TV on, or maybe to turn it off. I can't remember. But across many decades, I do remember her shouting at me, "No! I amn't gonna do it!" I was surprised—not with the substance of what she said, but with the form: I *amn't* gonna do it. I thought to myself, you can't say *amn't*. But she did! Why? Why did she say that? And why did I take notice?

Maya Honda recalling a childhood experience

1. Introduction

Across more than thirty years of teaching together, we have examined this and other apparent mysteries of language and language development with students in a variety of classroom settings, from primary and secondary school students, to college students, to pre-service and in-service teachers (Honda and O'Neil 1993, O'Neil 2007). We have sought to introduce students to linguistics by engaging them in 'thinking linguistically' about knowledge of language: investigating and explaining what speakers know about the grammatical structure of language. This work is centered on telling a connected story about language (syntax and (morpho)phonology), constructed from problem sets derived from our book, *Thinking linguistically: A scientific approach to language* (Honda and O'Neil 2008). We have integrated cooperative teaching and learning with a problem-set-based approach to linguistic inquiry in order to establish an intellectual climate in the classroom in which students at all levels can develop a scientific style of argumentation and an appreciation of the nature of scientific work. Our goal has been to develop students' natural curiosity about language into an understanding of it through scientific inquiry: identifying problems, collecting and analyzing data, formulating testable hypotheses and evaluating them by searching for counterexamples, and revising or rejecting hypotheses on the basis of evidence.

This work is directed toward triggering the human science-forming capacity that is a part of our biological endowment and that is so elegantly described by Sylvain Bromberger (1992: 1-2):

We start out with little prior information about [the] world, but we are endowed with the ability to come to know that there are things about it that we don't know, that is, with the ability to formulate and to entertain questions whose answers we know we do not know. It is an enormously complex ability derived from many auxiliary abilities. And it induces the wish to know the answer to some of these questions. Scientific research represents our most reasonable and responsible way of trying to satisfy that wish.

It is our belief that the questions that arise in linguistic inquiry represent a fruitful way to induce in

students “the wish to know” and thus to introduce them to scientific research in the domain of language.

In what follows, we present evidence in support of this hypothesis, highlighting our work in two quite different settings. We begin by discussing the rationale for using language as the domain of scientific inquiry. Next, we describe the problem-set-based approach to linguistic inquiry that we have adopted and summarize two tests of our approach: the first with secondary school science students investigating phenomena in English, their native language, and the second with Native American undergraduate and graduate students enrolled in an intensive summer linguistics course investigating phenomena across a variety of languages, including their heritage languages. We conclude by considering the role linguistics should have in general education.

2. Rationale

Let us return for a moment to Bromberger’s remarks above. Although most people would agree that they have “the ability to formulate and to entertain questions,” few would consider themselves able to appreciate much less engage in scientific work. This is in large part due to the widespread belief that questions of science are arcane or distant from ordinary experience. Schools are culpable here, for students are often introduced to science in domains where their experience is limited and/or where their commonsense understanding is at odds with things in nature. Very little inquiry is possible or easily motivated conceptually when the problems of science—from a commonsense point of view—seem unproblematic to students.

Examining one’s own language, however, can immediately reveal problems to be investigated. For example, in ordinary speech, speakers of English can contract *want to* to *wanna*, as in (1):

- (1) Where do you want to go? → Where do you wanna go?

Given the frequent use of *wanna*-contraction in casual conversation, it would be quite reasonable to assume the null hypothesis: there are no constraints on *wanna*-contraction: you can say *wanna* whenever you *wanna*. However, this is not the case, as shown by (2):

- (2) Who do you want to go? → *Who do you wanna go?

Why is this so? Apparent mysteries of this sort—in which the null hypothesis fails—can readily be turned into problems to be investigated and solved.

The accessibility and familiarity of this kind of data ensure that all students can easily engage in data collection. As Ken Hale (1970-1972: 4) so aptly put it, “The linguist or native speaker is in one respect better situated than other scientists. He does not need a lot of equipment to observe the data he studies—he has in his head knowledge of his own language; he can therefore observe his own speech.” Moreover, we have found that students who are not native speakers of the language under

investigation can nevertheless participate actively, relying on classmates who are native speakers for grammaticality judgments and other data, but not for scientific insights into the language.

Another feature of linguistic inquiry is the conceptual accessibility of possible explanations for particular phenomena and the linguistic concepts necessary to formulate such explanations. For example, our early pilot work with secondary school students revealed the ease with which they learned the phonological feature [\pm voice] and used it to construct a hypothesis for noun plural formation in English based on the voicing of the final sound of the singular noun and its plural suffix; one group of ninth- and tenth-graders went even further, generalizing their plural formation hypothesis to account for English past-tense formation, a phenomenon that also involves voicing assimilation.

Certainly, people of all ages find language captivating. As Maya's childhood memory reveals, children too can wonder and think about language. Fabb (1985) and Denham (2007), among others, have shown that the metalinguistic awareness of primary school students can motivate lively and thoughtful examination of the structure of language—its phonology, morphology, syntax, and semantics. Thus, the domain of language is a rich and accessible resource for engaging students at all levels in inquiry.

3. Thinking linguistically with students

3.1 Motivating and supporting linguistic inquiry

According to Noam Chomsky (1993: 25), “Serious inquiry begins when we are willing to be surprised by simple phenomena of nature, such as the fact that an apple falls from a tree, or a phrase means what it does.”

Serious inquiry can be motivated by taking an apparent mystery and turning it into a problem to be solved. Working this way to design problem sets, we constrain the data set in order to focus students' analysis and hypothesis formation. Once students have formulated a hypothesis or a set of them, we ask them to consider the forms that counterexamples might take, even in the abstract. Counterexamples when found or provided should then prompt reanalysis of the problem as well as hypothesis revision or reformulation.

3.2 The problem-set-based approach to linguistic inquiry

The problem sets that we have developed, derived in part from Honda and O'Neil (2008) and from the work of our students, focus on two fundamental features of language: How do you talk about more than one of something in language (noun phrase pluralization, for the most part) and how do you ask a question in language? Working with both English, the native language of most but not all of the students we have worked with, and with several other languages, the students come to understand some things about both the language-universal and the language-particular features of plural noun

formation and question formation and the relatively restricted variation there is among languages, setting aside the obvious phonological differences that exist. There are suffixes and prefixes; right edges and left edges; movement and no movement; etc. Working across several languages, with an emphasis on these two purposes for which language is used, allows us to introduce students to linguistic science.

The problem sets work from the bottom up when English is the target language; top down when analyzing languages not known by the students. Just as the slave in Plato's Socratic dialog *Meno* is shown to have tacit knowledge of the Pythagorean theorem that can be brought to consciousness, so too does a speaker of English have tacit knowledge of plural noun formation that can be brought to the surface and explained in some detail. So, when working with English, leading questions can elicit the relevant data and its explanation from the class, while for languages other than English, the data have to be provided, for which explanations, nevertheless, can quickly follow. An example of the latter type follows:

The plural forms of Cherokee *ayvwi* 'person' and *uguku* 'owl' are *aniyvwi* and *uniguku*, while the plural forms of *taluja* 'basket' and *gakohdi* 'plant' are *ditaluja* and *digakohdi*. Why?

By providing more plural forms of each type (formed by prefixing *di-* or by infixing *-ni-* (that is, moving the prefix into the word—a 'middle-fix', as one fifth-grader labeled it), students come to see that an explanation follows from a fundamental meaning difference often at play in language: the easily accessible concept of whether a noun is animate or not—though animate is not necessarily the term that students come up with. (The technical terms of linguistics can wait, though not for long. Fifth-graders especially seem to enjoy using terms such as 'morphophonology'.) As more data are introduced, some phonological complexities emerge in Cherokee pluralization, but the basic [\pm animate] and *di-/ni-* distinctions hold throughout.

English noun plurals, on the other hand, are formed by affixing /s/ to the right edge of the word, which once affixed is slightly modified to /z/ and /ɪz/, based on the phonological features of the final sound of the singular noun, but which remains fixed at the right edge: *cats* /kæts/, *figs* /figz/, *bridges* /brɪdʒɪz/. The phonological feature [\pm voice] is central to explaining English noun pluralization—voicing assimilation being necessary but not in itself sufficient; vowel epenthesis too is needed. Recognizing this in part and seeking parsimony, a ninth-grader integrated separate statements about when to add /s/ and when to add /z/ into the simpler statement: "Keep [the] end sound going."

English past-tense formation is similar to noun pluralization, requiring both voicing assimilation and vowel epenthesis, as in *played* (with /d/), *talked* (with /t/), and *waited* (with /ɪd/). A group of ninth- and tenth-graders (including the student mentioned above) saw the relationship between the two sets of data—that if the noun or verb ends in a [+voice] sound, the plural or past-tense suffixes must also be [+voice] and so on, and extended their hypothesis for the plural to the past tense. One of the students proposed a diagram to represent this relationship, saying, "You could have a bigger circle

being [our hypothesis] ‘continue the voicebox vibration of the last sound’, and then off of it you could have the S-ending, D-ending, etc., etc., etc.” (see Honda 1994: 49-52).

Solutions to how English plural noun formation and past-tense formation work can be triggered by simply asking students to turn a singular noun into a plural noun, or a verb into its past-tense form. Once students’ initial focus on irregular nouns and verbs is set aside, the work can proceed on the basis of the regular data the students provide.

The previously mentioned constraint on *wanna*-contraction that disallows (4), but does not affect (3), is particularly surprising to students—a mystery waiting to be turned into a problem to be solved: Why can’t you say *wanna* whenever you *wanna*? Its solution is explained through an understanding of English question formation. Simply put, if the question word has been moved from its “home” between *want* and *to*, then contraction is not allowed.

(3) Where do you want to go? → Where do you wanna go?

(4) Who do you want to go? → *Who do you wanna go?

We can identify where the question words of (3) and (4) “belong” by reformulating the two questions as their surprise-question versions (5) and (6):

(5) You want to go where?!

(6) You want who to go?!

Wanna-contraction is possible in (5) but obviously not in (6), for there is a *who* between *want* and *to*. Thus even when a question word has been moved out of its home, “memory” of it remains and that memory has effect.

There are also *wanna*-contraction ambiguities, as in (7):

(7) Who do you want to visit?

Here, is *want to* contractible or not? Where is *who* at home? Is more than one home possible?

3.3 Connected stories about language

The problem sets that we have developed convey various connected stories about language, as is clear from the examples in the previous section. Note that even an explanation of *wanna*-contraction, while itself not an example of a connected story about language, relies on a connection

within the language: there must first be an explanation of English question formation before there can be an explanation of the constraint on contraction. We consider this sort of dependency as we organize the presentation of problem sets and we ask students to add what they learn from a problem set to their “linguistic tool kits” for future use.

Connected stories about language arise when students see similarities between languages, that Spanish noun pluralization, for example, overlaps with that of English, requiring vowel epenthesis when the singular noun ends in a consonant but not with a vowel, *papel* : *papeles* and *libro* : *libros*, for example.

Connection of a different kind is made when a Navajo student notes with surprise, “My language is like Mandarin Chinese.” Why? Because in both languages noun pluralization suffixes are generally left unspoken and when spoken are restricted to [+human] nouns; for example, Navajo ‘*at’éeéd* : ‘*at’éeéké* (‘girl : girls’); Mandarin Chinese *pengyou* : *pengyoumen* (‘friend : friends’). But the words in these two languages for *book* (Navajo *naaltsoos*; Mandarin Chinese *shu*) are undifferentiated for singular and plural. That information has to be found in the context in which the word is used.

3.4 Evaluating the problem-set-based approach to linguistic inquiry

3.4.1 A first test with secondary school science students

What grew into *Thinking linguistically* (Honda and O’Neil 2008) was born in the 1980s, when we worked with a team of science educators and university researchers at the Educational Technology Center at Harvard Graduate School of Education to design curricular materials to impart a constructivist understanding of the nature of scientific inquiry in several domains, including language. Working with Carol Chomsky and Risa Evans of Harvard Graduate School of Education, we developed problem-set-based linguistics lessons for inclusion in a month-long inquiry-directed unit designed to replace the standard unit on the scientific method. In this initial phase of our work, problem sets focused on phenomena in English, the native language of the students in the classes where we worked; phenomena included plural noun formation, past-tense formation, *wanna*-contraction and the contraction of *is* onto the preceding word. After being piloted and revised numerous times, two weeks of problem-set-based linguistic inquiry lessons were put to a test with seventh- through twelfth-grade science students in schools in Cambridge, Newton, and Watertown, Massachusetts. Results indicated that *all* students benefited from the linguistics lessons, making some significant progress in moving away from their naïve realist view of how scientists come to know and understand things in nature and toward a more constructivist view. See Honda (1994, 1999) for a detailed discussion of this work.

When the Educational Technology Center project ended, our work went in a new direction. We were asked to develop a linguistics course at Wheelock College (Boston, Massachusetts) with a focus on second language acquisition for pre-service teachers of English Language Learners. The constraints on the course were demanding: first, although students had little or no background in traditional grammatical analysis, they had to learn enough linguistics within a semester’s time to relate linguistic theory to research on second language acquisition; and second, students were not likely to continue

their linguistics education (nor could they at Wheelock). We had to plan the course as if it were, to use Michael Flynn’s words, “the last linguistics course” and “assume that the intellectual ‘payoff’ for every piece of terminological innovation, technical apparatus, and conceptual framework...be contained within the course” (Flynn 2000: 116).

These limitations motivated us to develop new course materials, including problem sets on the languages and varieties of English represented in Greater Boston area schools: Spanish, Brazilian Portuguese, and Caribbean English, for example. (Some students too developed problem sets about their heritage languages, as we discuss in §3.4.2.) The course integrated problem-set-based inquiry with detailed explications of cross-linguistic phenomena in the context of linguistic theory and research on first and second language acquisition and contributed to the development of *Thinking linguistically* (Honda and O’Neil 2008).

We have also used these same problem sets (albeit in slightly revised forms) to engage pre-college level students in inquiry about languages other than English. For example, we have done problem-set-based linguistics in a variety of languages with fourth- through sixth-graders, working for many years with David Pippin in his social studies and English language arts classes in the Greater Seattle, Washington area. We have consistently found that uncovering and investigating the surprises of language—of the vernacular, in particular—interests students in the structure of language and motivates inquiry (Honda, O’Neil, and Pippin 2007).

Additionally, we have worked in Malden, Massachusetts with a small class of ninth-through twelfth-grade English Language Learners, focusing our attention—and theirs—on the analysis of their native languages, a resource that is generally neglected (if not rejected) in school. With these students too, linguistic inquiry proved stimulating and yielded interesting discoveries about their own languages and the languages of their classmates (Ginsberg, Honda, and O’Neil 2011).

3.4.2 A more demanding test with Native American students and educators

Our problem-set-based linguistic inquiry materials were put to a rigorous test in 2000 and 2001, when we taught at the American Indian Languages Development Institute (AILDI) at the University of Arizona in Tucson. Founded in 1978, AILDI’s mission is “to provide critical training to strengthen efforts to revitalize and promote the use of Indigenous languages across generations...by engaging educators, schools, Indigenous communities and policy makers nationally and internationally through outreach, transformative teaching, purposeful research and collaborative partnerships” (aildi.arizona.edu/mission). AILDI offers undergraduate and graduate level summer courses in cultural education, linguistics, and immersion teaching methods. We offered a month-long course called Workshop in Linguistics, the catalog description of which is as follows: “Presents linguistic inquiry as a way of developing critical thinking at all age levels; an in-depth examination of participants’ languages and development of inquiry-based materials.” The majority of the students in the course were Native Americans; some were heritage language speakers; all were interested or directly involved in language

education and revitalization.

On the first day of the 2000 workshop, we told the class that we would engage in linguistic inquiry by working through problem sets about phenomena from English as well as other languages, including Mandarin Chinese. At that point, one of the students stood up and said, “We’re here to learn about Indian languages.” It was a significant moment, for Native American languages are not an area of expertise for either of us. All we could say was that we hoped by the end of the course that students would understand how to tell a connected story about language—any language, including their own.

The workshop proved to be intellectually exciting—and exhausting—for us as well as for the students. The pace was intense, with the workshop meeting three and a half hours a day, four days a week for a month. The first week focused on plural noun formation in varieties of English and ended with a homework problem set on pluralization in Mandarin Chinese. By the second week, students began working in class with partners or in small groups to analyze plural noun formation in the heritage languages represented in the class, including Cherokee, Tohono O’odham, Navajo, and Sahaptin. This in-class collaborative work supported students’ efforts to develop problem sets that they might use with their own students. That same week, we gave the class problem sets on question formation in several languages. And so the workshop went. In the third and fourth weeks, students presented their problem sets on plural noun formation in their heritage languages, challenging the rest of the class to solve them. They also turned to constructing and later presenting problem sets on question formation in their languages.

The Workshop in Linguistics earned excellent evaluations. One participant wrote, “I was totally immersed in this workshop.” Consider the following written comments about the most useful aspects of the course:

- Allowing people to ponder their own native languages in this manner was most valuable.
- I learned to look at the different languages in a special and meaningful way.
- Realizing our own heritage languages are very useful scientific and teaching resources.
- The application of linguistic inquiry in primary/secondary classrooms.

From our perspective too, the workshop was a successful teaching and learning experience, as was the workshop in 2001. Students worked incredibly hard and met the course goals, one of which, the creation of problem sets about heritage language phenomena, is to our minds a significant indication of the positive impact of the course.

Their accomplishments enriched our teaching, as well; one AILDI student’s problem set on plural noun formation in Cherokee is included in *Thinking linguistically* (Honda and O’Neil 2008).

Based on the outcome of the AILDI course, we introduced the construction and presentation of problem sets as an option for the final project in our course at Wheelock College. The problem set on plural noun formation in Armenian that is included in *Thinking linguistically* (Honda and O’Neil 2008) is an early result of a student’s exercising this option. Over the years, student-developed problems sets on Croatian, Hungarian, and Spanish, among other languages, have followed on the initiative of the students who developed the Armenian and Cherokee problem sets.

4. Conclusion: Linguistics in general education

Before the days of email, a sixth-grade teacher named Frederica Davis sent Noam Chomsky a paper of hers (Davis 1984) along with a letter asking whether he thought the study of grammar would or could improve writing. Chomsky (1984: 165), claiming no special insight into the matter, replied, “My uninformed guess would be that the study of grammar would have little detectable effect on writing ability, but I think it should be taught for its own intrinsic interest and importance.” By the term “grammar,” Chomsky meant traditional grammar in the sense of the Danish linguist Otto Jespersen, not prescriptive school grammar typically taught in schools.

Chomsky (1984: 165-166) then went on at some length about a role that *linguistics* as distinct from grammar should play in education:

If contemporary linguistics is to be taught ([and] I think it should be), it is in a different context. I do think it offers an incomparable avenue to understanding the nature of the human mind. It also can provide students with a way to understand how science works. There are questions that are, or should be, fascinating and puzzling: for example, why does the sentence “who did the boys expect to see them” allow the interpretation with them referring to boys, while the sentence “the boys expect to see them” does not. Or why do the sentences “John is too stubborn to talk to Bill” and “John is too stubborn to talk to” have different “understood subjects” for “talk to” (“John” in the first case; someone other than John in the second). And myriad others. These are simple, but very puzzling facts. Every child has command of a huge mass of data of this sort. It is also possible to develop explanatory theories of a rather non-trivial sort that explain some of these facts, and to do it without resort to higher mathematics or other conceptual tools not available to the student (or teacher, generally). In this way, one might be introduced into the marvelous world of inquiry in which one learns to wonder about the nature of what seem, superficially, to be obvious phenomena, and to ask why they are the way they are, and to come up with answers. This is an experience generally lacking in the study of the sciences unless the instruction is really done superlatively well. These are all reasons for studying contemporary grammar—as a branch of science.... I doubt that it will improve writing style, but it could help students learn how (and why) to think hard about intriguing questions, and to develop the natural curiosity that is often dulled by what we (perhaps misleadingly) call “education”.

Chomsky's letter to Davis appeared in *English Education*, a widely-read publication of the National Council of Teachers of English, a professional organization in the United States. Yet despite its prominence, Chomsky's letter had little effect on education about language in US schools.

Nevertheless, linguists and educators in the US, the United Kingdom, and Australia have been and are working to establish a place for linguistic science in the education of young people, and for the study of language more generally. In addition to our work, there have been a growing number of efforts in recent years to introduce aspects of linguistic inquiry into the primary and secondary school curricula of English language arts, social studies, and science (see, for example, the papers in Denham and Lobeck 2010; Reaser and Wolfram 2007, Lidz and Kronrod 2014), as well as into extracurricular activities and programs (for example, Stewart and Kuhlemann Cárdenes 2010, Clark and Trousdale 2012, Hudson and Sheldon 2013, Estival et al. 2014, McKee et al. 2015, Wagner et al. 2015). Common to all of these efforts is a focus on the active involvement of students in analyzing language data and uncovering the patterns and structures of their own as well as other languages.

We conclude this paper with the following paragraphs from "Looking Ahead," the final section of *Thinking linguistically* (Honda and O'Neil 2008: 241):

These answers [to questions about knowledge of language] support a generous view of humankind: we are born equally endowed with the predisposition to acquire language. Moreover, in its focus on universal principles of language, linguistic inquiry provides us with an important model for how to examine diversity: We value and study differences between languages and varieties of a language for what they might reveal about the universals of language....

We believe that linguistics should have a prominent place in education.... Through the investigation of language, students of all ages can learn not only about language, but also about the nature of scientific inquiry, and indeed, something about themselves as well.

Moreover, teachers too can be linguistic researchers, learning something about the structure of the languages and language varieties that their students speak or of the second languages that they are learning to speak. They can also come to see that teaching and learning about language can turn their students into critical thinkers. This has certainly been our experience.

We encourage you to think linguistically and to pursue this possibility.

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Note: The papers marked with an asterisk (*) in *Works cited* can be downloaded from Papers in Linguistics and Education: <http://web.mit.edu/waoneil/www/k12/> Only Chapter 2 of Honda (1994) is available at this URL.

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