



Numeracy in Amazonian Languages: Does Language Determine Thought?

By Leonardo Oliveira

How much does language influence our general cognitive capacity? Does language have only a minimal effect on these other capacities or does it frame the way we can represent the world? Yes, the Sapir-Whorf hypothesis is again a hot topic.

ELF Welcomes New Board Member

The Endangered Language Fund is pleased to welcome its newest board member, Louis M. Goldstein. As the new chair of the Linguistics Department at Yale University, Louis is a member of our board *ex officio*.

Louis M. Goldstein

Louis Goldstein received his Ph.D. in Linguistics from the University of California, Los Angeles, in phonetics. He has been a member of the Linguistics Department at Yale University since 1982. He is the author, with Catherine P. Browman, of the theory of articulatory phonology, which asserts that the sounds of all human languages can be described as “gestures” in the vocal tract. This theory has convincing accounts of some of the most troublesome aspects of sound systems, such as acquisition by infants, the changes due to speaking quickly, and language change. The Fund is honored to have Louis on the board.

Two articles recently published in Science by Peter Gordon (2004) and Pierre Pica and colleagues (Pica, Lemer, Izard, & Stanislas, 2004), shed new light on the influence of language in other cognitive capacities. The evidence comes from counting systems of two endangered languages in the Brazilian Amazonia, Pirahã (Gordon) and Mundurukú (Pica et al.). Both works have the merit of assessing the question with mostly non-linguistic tasks and obtaining similar results which are compatible with a stronger version of the Sapir-Whorf hypothesis, although the authors have different interpretations.

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ELF Annual Meeting Set for January in Oakland, CA

The Endangered Language Fund will hold its annual meeting at the Marriott Oakland City Center Hotel on Friday, 7 January, 2005, from 8 to 9 a.m., in Oakland, California. It will be in Board Suite 410. As is customary, this is being held in conjunction with the annual meeting of the Linguistic Society of America, who kindly gives us a room for the meeting. We will have updates on our activities along with reports from some previous grantees. We hope that you will be able to attend.

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Announcements

“Bambi” in Arapaho available

Disney's classic "Bambi" has been released in the Arapaho language to help preserve a fading Arapaho language and culture. The Wyoming Council for the Humanities, a non-profit, state-based educational program of the National Endowment for the Humanities, has a limited number of videotapes of "Bambi" in Arapaho--the first feature length children's animated movie ever dubbed into a Native American language available for linguists, anthropologists, educators, and other interested persons. The cost is \$20 plus \$8 shipping. Proceeds from the videotape are earmarked for Native American language preservation projects.

Wyoming Council for the Humanities
1315 East Lewis Street
Laramie, WY 82072
(307) 721-9243
www.uwyo.edu/wch/bambi.htm

Checks can be made out to Wyoming Council for the Humanities or WCH.

Conference on Endangered Languages and Cultures of Native America

The first annual CELCNA meeting will be held April 8-9, 2005, on the University of Utah campus in Salt Lake City, Utah. The keynote speaker will be Dr. Leanne Hinton (Chair, Dept of Linguistics, University of California, Berkeley).

We invite papers dealing with any aspect of endangered Native American languages, in particular on documentation or revitalization. Papers are 20 minutes each in length, with an additional 10 minutes for discussion. ABSTRACTS MUST BE RECEIVED by Jan 14, 2005. The program committee will attempt to provide notification of acceptance by Jan. 21 (by e-mail). Additional information on CELCNA will be posted on www.hum.utah.edu/linguistics. Address enquiries for further information to Phatmandu7@aol.com (Jen Mitchell), or julialice@yahoo.com (Julia Pratt).

Native Nations, Native Voices, July 2005

To honor Native language authors, Native language writers have been invited to participate in a three-day festival. Writers will read from their works in their own languages; National language translations will be made available to the audience at the option of each writer. A special effort has been made to include and honor high school and college authors in Native languages, for they are the future of languages. Selected writers represent as broad a range of languages and styles as possible. There are 21 authors from 8 countries in the Americas participating, plus one author from Hawaii.

The festival will take place in Albuquerque, NM. It is tentatively set for July 24-30, 2005.

The Pirahã live along the banks of the Maici River in the Lowland Amazonian in Brazil. They have very limited contact with Brazilian culture and most are monolingual in their language. The total population is of less than 200 individuals, distributed in small villages of 10 to 20 people. Of particular interest is the rare Pirahã counting system, which has only words for “one” and “two.” Larger integers are represented by either two different forms which mean essentially “many.” The Pirahã also do not use recursion for counting. Gordon's question was whether the Pirahã were able to represent integers higher than two with accuracy, even not having terms for this purpose.

Gordon's experiments consisted of 6 matching tasks, in which Pirahã speakers (four tested) should match the number of batteries (a familiar object for them) in different spatial conditions and 2 tracking tasks with different exposure conditions. The results show that the Pirahã perform accurately up to two or three. For larger integers their performance decreased significantly and was found to be inversely proportional to the target integers, i.e., smaller accuracy for larger numbers. The results suggest that the Pirahã counting system seems to limit their capacity of dealing with integers higher than two or three. They seem to use analogue estimations for larger sets, analogous to experiments with prelinguistic infants and monkeys. Gordon's conclusion is that the Pirahã's counting limitations can be seen as a case of strong determinism, as it extends beyond linguistic abilities.

The Mundurukú language is spoken by about 7000 individuals in the state of Pará in Brazil. The Mundurukús have more contact with Brazilian culture with many bilinguals. The language also has a rare counting system, with words for integers 1 to 5. Integers larger than 5 have imprecise representation, and only in around 30% of the experimental situations.

Differently from Gordon, Pica and colleagues' study (with 55 speakers) also employed linguistic tasks to measure the Mundurukús performance with larger integers. The tasks were: 1) asking the number of dots presented in a display (verbal re-

sponse); 2) addition plus comparison of large sets (non-verbal response); and 3) explicit manipulation of exact quantities in a subtraction task in which the response was made through pointing. All results were compared with the performance of control group of French speakers. Only the second task had a consistent similar results for both groups. The results are similar to Gordon's study: the Mundurukús have poor performance for quantities larger than two, but their approximate estimation abilities match closely those of the French control group. This good approximation performance is interpreted as evidence of a basic ability that is language independent and that this numerical competence can be present even with an impoverished lexicon for number words, and so the lack of words does not imply a poor counting capacity. As further evidence, Pica and colleagues offer the fact that the Mundurukús do have words for quantities higher than 2, but they are not used with precision. They offer as explanation the fact that the Mundurukús do not have counting routines, as Western speakers have.

Mark Liberman has some concerns about this interpretation; see his discussion on Language Log (Liberman, 2004). He imagines a language that has only two words for throwing, and that people in the community simply do not throw things. If tested, they would probably be good at throwing one meter, or two meters, and then their accuracy would be horrible. Would this mean that their language determined their throwing ability? Clearly, practice would play an important role in the limitation on throwing ability; thus the similar case of counting may be entirely due to practice. Liberman's argument has some merit, but it is interesting that the only way those of us who use languages with elaborated counting terms can only think of doing the counting by means of language. More important, when we deprive such speakers of the use of language, they behave very much like the Pirahã and Mundurukú. It does not appear that we are genetically inclined toward using higher numbers, but we do seem to be for one and two. Even infants can perform simple math with num-

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bers up to two or three, as shown by the clever experiments of Karen Wynn (1998). There, she found that infants were puzzled when the number of toys revealed when a screen dropped was different from the number they had seen going behind the screen initially. Though this result has been challenged by some researchers, it is an intriguing complement to the number manipulation evidenced by the Amazonian groups.

Both Pirahã and Mundurukú offer a rare opportunity to examine unusual counting systems and their influence on cognitive capacities. The study of both languages is an example of the importance of the ELF mission of helping to document languages, as their extinction would mean the permanent loss of unique linguistic resources. Such unusual systems allow us to ask questions which cannot be easily investigated in languages with elaborated number systems: It would be very surpris-

ing to find a language that maintained number terms but did not use the concepts underlying them. It may only be thanks to languages that have evolved with different circumstances to address that we can really test the possibility that language might determine thought.

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