

Pedro (Pete) Aceves

Dissertation Précis

The Linguistic Relativity of Collective Cognition and Group Performance

The long-researched linguistic relativity hypothesis predicts that the structure of a person's language influences their cognition. While this hypothesis has only been pursued in the context of how language affects individual cognition, my dissertation extends this argument into sociological territory by examining how the structure of language influences collective cognition, social interaction, and group performance. Drawing on linguistic, cognitive, and information theory, I create novel estimates of information density (the degree to which the word distribution within a language compresses the conceptual space, understood as the multidimensional space in which concepts exist) and communicative efficiency (the baseline speed at which a language transmits speech information) across the world's languages. I then use computational, archival, and experimental methodology to trace how these language attributes affect the *nature* of social interactions and collective cognition as well as the way information *flows* through those interactions, thereby affecting overall rates of group performance.

Chapter 1 describes the theory and measurement procedure for these novel language structure attributes. In chapter 2, I argue that high information density in a language facilitates movement through the conceptual space of a language, which should lead to better group performance in tasks requiring effective planning, problem-solving, and creativity. I then argue that high communicative efficiency in a language overcomes the articulatory bottleneck (i.e. the fact that speech production is the slowest part of human speech communication) that slows down interpersonal information transfer, and should lead to better group performance in tasks that face time-pressures. Tracing the outcomes of all monolingual expeditions to the Himalayas from 1905 to 2015, I show that speaking high information density languages is associated with summiting a larger proportion of team members, and conditional on reaching the summit, with teams arriving more quickly. In contrast, I show that speaking more communicatively efficient languages is associated with a lower likelihood of experiencing deaths during the expedition.

For chapter 3, I am currently coordinating two experimental studies to further theorize the effect of information density on group performance and to trace the mechanisms responsible. These studies are funded by a National Science Foundation Doctoral Dissertation Research Improvement Grant. In the first study, I randomize 300 multilingual individuals to three-person teams. This experiment is being performed at the Center for Experimental Social Science at FLAME University in Pune, India. I compare group performance on a creativity task for teams that speak English (high on information density) to those that speak Urdu (low on information density). My expectation is that high information density languages will permit a more fluid and expansive set of associational possibilities within the conceptual space, thereby allowing teams to more quickly saturate the high-payoff recombination possibilities and reducing the likelihood of getting stuck at dead-ends or in sub-optimal locations within the solution space. Using word-embedding models of the conceptual space, I will be able to precisely trace how individuals move through this space during their conversation. This research design strategy overcomes many of the challenges in cross-linguistic research having to do with unobserved heterogeneity across cultural and economic dimensions, given that individuals will be matched as closely as possible on a number of characteristics including educational background, region of origin, and social class.