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A Linguistic-based Measure of Cultural Distance and Its Relationship to Managerial Values[1]

Abstract

■ Measuring culture is a central issue in international management research and is traditionally accomplished using indices of cultural values. Herein we present a new linguistic-based measure of cultural distance (based on linguistic genealogical classification) that is both more fundamental and more widely applicable than values surveys.

Key Results

■ We then use structural equation modeling techniques to show links to the cultural values dimensions delineated by Hofstede (1980). We also demonstrate relationships between linguistic distance and other measures of managerial values using three additional data sets.

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It was intended that when Newspeak had been adopted once and for all and Oldspeak forgotten, a heretical thought that is, a thought diverging from the principles of Ingsoc should be literally unthinkable, at least so far as thought is dependent on words.

George Orwell, *1984*

Language carries with it patterns of seeing, knowing, talking, and acting ... patterns that mark the easier trails for thought and perception and action.

Michael Agar, *Language Shock*

Although written almost fifty years apart, Orwell (1949) and Agar (1994) succinctly anticipate the fundamental issue addressed in this paper: to what extent is management thought dependent on language spoken? Our purposes here are twofold. First we propose a new measure of cultural distance – linguistic distance – that can be readily applied in the broadest array of cross-cultural research circumstances. Second we test hypotheses about the influence of language spoken on managerial values in the international context. Toward these ends we specifically determine the relationship between our measure of linguistic distance (based on linguistic genealogical classification) and Hofstede's (1980) four dimensions of culture using two separate sets of data. The relationships between linguistic distance and other multi-cultural measures of management values are also explored using two other data sets.

From the early study of Haire, Ghiselli, and Porter (1966), empirical work on managerially relevant differences in culture has tended to focus on values. The recent emphasis of this approach can be directly attributed to Triandis (1977) and Hofstede (1980). The latter provided numerical values for four measures of culture, allowing cultural differences to be directly used as independent (or moderating) variables to explain differences in behaviors in business settings across cultures. Such differences have included, for example, reward allocation, human resource practices, strategic choice, and negotiation styles.

There are limits to usability of these values-based measures of culture, however. Because of cost, researchers have generally been constrained in the breadth of their work, limiting comparisons of Hofstede's indices (to take one example) to areas of the world where his IBM sample had operations (primarily developed nations and Latin America). Meanwhile, concerns have been raised as to whether values measures within a particular multinational corporation or occupational category reflect the population as a whole. But values are not the only manifestation of culture that can be measured. In this study is proposed a more fundamental cultural dimension based on linguistic distance, which is available for a wider range of cultures than any previous measure, and is inherently more representative of a culture's literate members.

Culture and Values

Although leading researchers disagree about an exact definition, most concur on the idea of culture as a system of shared meanings. While recognizing the importance of the concept of organizational culture in the management literature, here the focal construct is the larger, societal level "cultures" often operationalized as the subject's nationality such as country of citizenship or birth (Earley/Singh 1995). This comprehensive and exclusive classification is convenient both for researchers and managers, but there are important theoretical and practical distinctions between national and cultural boundaries. A few researchers (e.g., Hofstede 1980, Graham/Mintu/Rodgers 1994) have considered culture at sub-national levels of analysis, which are particularly salient for countries with distinctive languages (Belgium, Canada) or large regional (China, Russia, US) variations. Others have noted that cultures such as the Chinese diaspora transcend political boundaries (e.g., Redding 1993).

Employee values have been shown to be managerially relevant because they help predict certain employee attitudes and actions (e.g., Kabanoff/Waldersee/Cohen 1995). Measuring values also provides an appealing way for researchers to quantify cross-cultural differences in business environments. If values constitute conceptions of the desirable (Kluckhohn 1954), and such values are used by individuals to filter their perceptions of the world around them, then shared values provide a cultural indicator that is both measurable and empirically relevant.

In an early international study of work-related values Haire, Ghiselli, and Porter (1966) analyzed 10-language groups of 3,641 managerial respondents, clustering 14 countries into five groups (Nordic, Latin, Anglo-American, Japan and Developing). Since then many studies have developed one or more specific numerical measures of culture, which are assumed to be interval scale. The most often cited is that of Hofstede (1980), whose *Culture's Consequences* provides measures for four composite variables developed from his surveys of IBM employees: individualism (IDV), power-distance (PDI), uncertainty avoidance (UAI), and masculinity (MAS). The 40 countries in this original report were later extended to 50 countries and three multi-country geographic regions (Hofstede 2001, Hofstede/Bond 1988). New data using Hofstede's measures continue to be collected by a variety of researchers around the world; and Hofstede (2001, pp. 501–502) reports scores on the four dimensions for an additional twenty-five countries and regions. Others have further manipulated and tested his original scores as well (e.g., Evans/Mavondo 2002).

In parallel to Hofstede, the Chinese Value Survey developed by Michael Bond and others (Bond 1988) also sought to measure values across multiple cultures, using an instrument that was explicitly centered on Chinese culture.

This work produced a fifth orthogonal dimension of cultural values, the so-called "Confucian Dynamism" or long-term orientation. Since Hofstede's study was published, a variety of other empirical, theoretical, and methodological works (cf. Triandis 1995, Schwartz/Bilsky 1990) have appeared on cultural values. Most recently, House et al. (2004) have "identified six global leadership dimensions of culturally endorsed theories of leadership." Their paper is the first report on a study that is the most ambitious in scope involving data collection (surveys of managers) in some 62 cultures around the world. They find both universal and culture specific dimensions of leadership. Most important for our purposes, they report country scores for the various dimensions they measure some of which coincide with Hofstede's dimensions.

Although other researchers have measured cultural differences, it is Hofstede's study that is by far the most often mentioned in international business with more than 1,000 citations (Søndergaard 1994). One reason is the study's unprecedented scope (i.e., theoretical and the number of cultures covered), but perhaps the main reason is the ease of application of his findings. In 274 studies published from 1980 to mid-1993, the dimensions were used as variables for explaining cross-cultural differences (Søndergaard 1994). For a more detailed review and critique of the culture and values literature and Hofstede's dimensions see West and Graham (1998).

Language and Values

The ideal cultural measure would be one that theoretically was representative of an entire culture (or perhaps nation), and would be readily available for any given culture. One such measure might be based on language, which is closely linked to both national and cultural boundaries. Fasold (1984) notes that designation of a national language facilitates the development of national identity and is thus in most cases a key prerequisite to the formation of a stable nation-state. At the same time, many of the most obvious sub- or supra-national divisions of cultural groups are found between language groups in multi-lingual societies such as Belgium, Canada, or Chinese Southeast Asia.

If language is to be a useful indicator of culture it should prove to be related systematically to other indicators such as the aforementioned measures of cultural values. Indeed, there is ample theoretical support for the notion that language influences values. Later we test the nature of that influence by comparing linguistic distance and differences in values across four data sets. But, first we briefly describe how and why language and values are connected.

The Causal Connection between Language Spoken and Management Thinking

Ronen and Shenkar (1985) note the association of management values to language. Indeed, they label the majority of their country clusters using linguistic terms – i.e., Anglo, Germanic, Latin, and Arabic. Is this association they and others have mentioned a causal one? When George Orwell wrote *1984* he was most assuredly influenced by the work of linguists Benjamin Whorf (1940) and Edward Sapir (1921) who had much earlier hypothesized that language influences cognition. The Sapir-Whorf hypothesis has led to two interpretations a weaker form of linguistic relativism ("language influences thinking") and the stronger linguistic determinism ("language determines thinking"). Recent work in the cognitive sciences appears to refute the deterministic form (c.f. Pinker 1994). In agreement with Crystal (1992), Agar most eloquently supports the linguistic relativism view, "Language carries with it patterns of seeing, knowing, talking, and acting. Not patterns that imprison you, but patterns that mark the easier trails for thought and perception and action." (1994, p. 71).

Still another linkage between language and values is suggested by Triandis' (1995) hierarchy of subjective culture. Based on his multi-country empirical study, Triandis proposed that values are derived from elemental cognitive structures, which in turn are derived from lower-level abstractions of language: words, morphemes, and phonemes. Language is also one of several proximal antecedents to various cognitive processes, which in turn are the antecedents of values in his subjective culture model. Most recently, Usunier (1998) provides an excellent in-depth discussion of language's influence on "world views and attitudes." Hofstede (2001) is quite clear on his support of the Sapir-Whorf hypothesis: "Our thinking is affected by the categories and words available in our language" (p. 21).

Finally, Richard Nisbett (2003) has provided much new evidence for the notion that language learned influences thinking. In one of his experiments he had Americans and Japanese look at the same picture and describe what they saw. "...Americans start out with describing an object ("There was a big fish, maybe a trout, moving off to the left") whereas Japanese start by establishing the context ("It looked like a pond") ... an idiomatic Japanese sentence starts with context and topic rather than jumping immediately to a subject as is frequently the case in English" (pp. 157–158). Nisbett's (2003) descriptions are entirely consistent with Hodgson's et al. (2000) descriptions of differences in sales presentations – for Americans proposals are followed by explanations (and context), and for Japanese the reverse is true. Most importantly, Nisbett (2003) argues that the observed divergence in thinking begins with language acquisition. That is, American parents focus on teaching kids clear, context-independent definitions of words. Alternatively, he, Hall and Hall (1987), and others argue that

definitions of words in Japanese are often ambiguous and highly context-dependent. The structures of the respective languages learned thus influence the foci and processes of thinking.

A Few Examples of the Potential Influence of Language on Hofstede's Values

So far the causal connection between language and thought has been argued for in only the most abstract terms. We will now offer specific examples of some of these "easier trails for thought and perception and action" as they relate to three of Hofstede's values measures. These examples are intended to be illustrative and not comprehensive. Language is the most complex symbolic system involving lexicon, letters, characters, grammar, inflection, intonation, phonemes, morphemes, prosody, semantics, syntax, aspect, content, context, and more. Our examples below cannot possibly encompass such complexity. So, our examples can be easily attacked on the grounds of reductionism and their simplistic nature. However, the examples well demonstrate how language might influence management thought.

Individualism/Collectivism

Some argue that the structure of a language is directly related to values such as individualism. For example, Pinker at some length talks about the most conspicuous ways English differs from other languages. Foremost he describes English as an "*isolating* language, which builds sentences by rearranging immutable word-sized units, like *Dog bites man* and *Man bites dog*" (Pinker 1994, p. 232). The words used are not much affected by the structure of the language. In many other languages adjectives, nouns, and verbs are modified by case, number, or person affixes. Spanish is a good example. It is an "inflecting" language wherein we are now all familiar with weather systems called *el niño* and *la niña*. The point is that information about social context is directly reflected in almost all words in the sentence. In English the word *doctor* is ambiguous as to gender, in Spanish the speaker must choose either *doctor* or *doctora* depending on the gender of the referent. Understanding of and appreciation for the social context is crucial for correct Spanish speech. Relative to other languages, the "isolating" structure of English helps English speakers ignore social context and subtly tends to elevate individuals vis-à-vis their groups. These differences seem to be reflected in Hofstede's data in the individualism scores averaged for the five English-speaking countries (average IND = 84) and thirteen Spanish speaking countries (IND = 22).

Most authors describe Japanese culture (IND = 46) as being one of the most collectivistic and group oriented (e.g., Nakane 1970). Hall and Hall (1987) tell us that the language itself cannot be understood independent of the social circumstances of its use. For example, they report that there are two words for truth, *tatemae* and *honne*, meaning the "socially appropriate" truth and the "actual" truth, respectively. The often reported indirectness of the Japanese language also preserves the all-important *wa*, or social harmony so crucial in that collectivistic society. The English language is better set up to directly deliver the required, precise information even if it upsets. Indeed, in this last respect, socio-linguist Deborah Tannen (1998) refers to the American conversational style as reflecting an "argument culture," wherein preserving "face" and warm social relations is far down the list of requirements for good communication.

Social Hierarchy (Power Distance)

The relative importance of group membership and role is reflected in several ways in different languages. For example, in most languages there is more than one form of the second person pronoun. In Spanish there is *tu* and *usted*, in Chinese Mandarin there is *ni* and *nin* – in both cases the former usage is less formal, less respectful, and more familiar. Alternatively, in the individualistic United States, where social position matters less, our dogs and our Presidents or priests would all be referred to as simply as *you*. Actually when the English first settled in the northeastern United States some 400 years ago there were two forms of the second person pronoun used – *thee* and *you* which roughly corresponded to *tu* and *usted*. One might argue that the individualistic values and behaviors necessary for conquering a new land might have caused the disappearance of *thee* (accept in Biblical reference) – group membership is not so important on isolated farms or ranches. However, this reversal of the causal arrow to values → language at the societal level does not weaken our argument for language → values at the individual level. That is, when an American child learns English today she learns a single second person pronoun, one whose usage requires no knowledge of group membership or role. Contrarily, a Chinese child learns very early that the distinction between *ni* and *nin* is an important one. All this seems consistent with Hofstede's data, therein Spanish speaking countries score a 69 on PDI, Chinese a 67, and English a 32.

So, English does not so much depend on the social relationship between speakers. However, speakers of many other languages literally do not know how to talk to one another until the social relationship is defined. This in part explains why in hierarchical Japan (PDI = 54) the business card (*meishi*) exchange is such an important ritual at the beginning of meetings. Social rank is clearly reflected in a comparison of business cards in Japan, and correct speech can only follow the exchange of them. Relatedly, in many other cultures titles are more important than in English speaking countries. For example, different from the

United States, it is quite common in Mexico to include one's bachelor's degree as a title on a business card or in an introduction – that is, *Ingeneiro* or *Licenciado* denoting engineering or legal studies, respectively.

Uncertainty Avoidance

We believe it is no accident that Greece (at #1, UAI = 112) and Yugoslavia (at #8, UAI = 88) are ranked by Hofstede as among the cultures most concerned with avoiding uncertainty. Crystal (1992) and Agar (1994) explain that in Slavic languages and Greek "linguistic aspect" is much more important than it is in English. Aspect is a grammatical category that marks the duration or temporal activity denoted by a verb – e.g., a contrast might be made between the completion of an action and its lack of completion. "Last night I read a book," is ambiguous about whether I finished the book or not. In Greek, the ambiguity (i.e., uncertainty) is eliminated by the verb form necessarily selected. Both Slavic languages and Greek make great use of such aspectual contrasts. Agar, based on his own experiences, describes how this difference in linguistic aspect can influence thought:

"As I tried to learn Greek, I found myself attending more than usual to the aspect of the verb I was about to use. In other words, I thought more – at first consciously, then with time automatically – about the world I was pushing into speech. Was I talking about a world of results or a world of processes, a finished world or an ongoing world? The answer told me which verb to choose" (Agar 1994, p. 65).

Again we see a way that the language learned can unconsciously elevate the importance of such concepts as uncertainty. We might expect Greek managers to be more concerned about uncertainty (than their English speaking counterparts, UAI = 43) because their language focuses their attention on the issue as illustrated above.

Finally, since the four data sets employed below include cultural values dimensions which are conceptually quite close to IND, PDI, and UAI, all this information is pertinent to the tests involving them. However, space limitations allow only this brief, but representative discussion of the mechanisms connecting language to values.

Hypothesis

The fundamental thinking reflected in the hypothesis stated below is that *the language a person learns as a child influences that person's values.* This hypothesis is consistent with the notions of linguistic relativism expressed by Sapir and Whorf. The hypothesis is tested here using four international samples of workers and managers wherein values are averaged across cultural groups, using the approach Hofstede (2001) describes as "ecological factor analysis." Because our

analyses are cross-sectional in nature we cannot perform a strong test of the causal sequence we believe to be operating here. Thus, while the central hypothesis is stated in correlational terms the associated tests undertaken presume a causal sequence of language values.

Hypothesis. The extent of differences in cultural values is associated with [directly influenced by] the linguistic distance between cultures.

The reader will also recall the dual purposes of the study, the first of which is introduction of the linguistic distance construct. When new concepts are introduced, a key issue is their nomological validity. In addition to providing evidence about the language/values connection, the analyses that follow provide measures of the nomological validity of linguistic distance. Ideally both the antecedents and consequences of linguistic distance would be considered in a nomological net. However, language is such a fundamental aspect of culture it becomes difficult to model its antecedents. Pinker (1994) describes three constructs that influence changes in languages over long periods of time: (1) linguistic innovation, (2) learning, and (3) migration. It is beyond the scope of this paper to try to measure and model these.

Methods

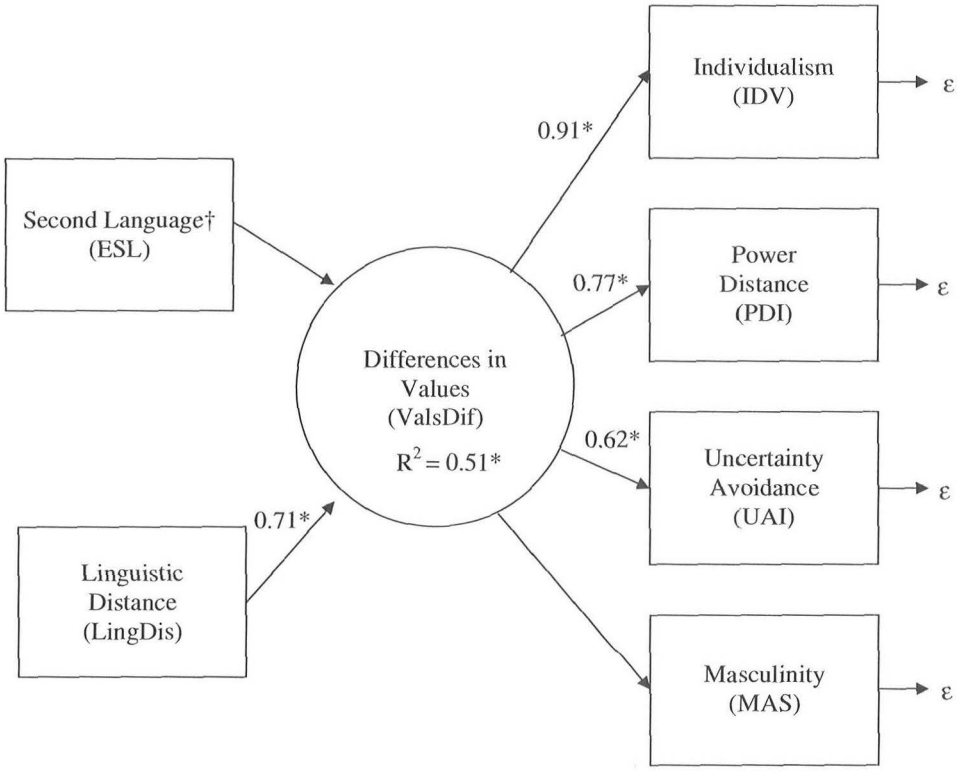
The hypothesis is tested using a sequence of analyses, data sets, and measures. We consider the first test using Hofstede's data the primary one (see Figure 1) and we report the most detail regarding it. The rest are secondary, still important, but not reported in detail. Common to all the tests is the measure of linguistic distance described immediately below.

Measures

Linguistic Distance (LingDis)

There are many possible ways of determining the dissimilarity of languages, including a variety of lexical, typological, or grammatical characteristics. Empirical evidence suggests cognitive differences are not limited to one type of dissimilarity (Kluckhohn 1954, pp. 937–940). It would be possible to combine multiple measures of language distance, incorporating, for example, vocabulary, syntax, and morphology. But for a single comprehensive measure of linguistic distance, arguably the best *a priori* choice is genealogical or genetic classification, which classifies language dissimilarity based on the existence (or inference) of common linguistic ancestors (Dakubu 1992). Besides the theoretical advantages, it is the

Figure 1. A Model of the Relationship Between Linguistic Distance and Differences in Values Across Cultures, Model B Results with Hofstede's Data, PLS Parameter Estimates



* $p < 0.05$, n = 51
† 1 = non-native second language used,
0 = native language used (ESL → UAI path = -0.52*

only measure that can be operationalized for such a wide range of languages. As Dakubu (1992, p. 56) concludes, "a major attraction of the genetic approach is that the classification it gives is both comprehensive and exclusive." Genealogical affinity usually implies grammatical similarity, and as Ruhlen (1991) notes, inherently incorporates lexical similarity because overlapping vocabulary is one basis for establishing systematic resemblance among members of a group of language.

The measure used here was constructed using the ideas of Grimes (1992), which lists some 6,500 languages based on the linguistic classifications of Bright (1992). Every language is part of an explicit family tree; 37 of 50 of Hofstede's countries used languages within the Indo-European family. Chen, Sokal, and Ruhlen (1995) have built on Grimes' hierarchy of languages and we directly borrow their tree to determining linguistic distance. We initially use English as the focal language and calculated the measure of distance from English (LingDis) listed in Table 1 by cod-

ing each language for the number of branches used to connect it to English. For example, Mandarin = 6, Spanish = 3, Swedish = 2 and German = 1.

For five multilingual countries it was appropriate to calculate weighted averages based on the percentages and mixes of language used in them. For example, according to the *CIA World Fact Book* (1997), 56% of Belgians speak Flemish as their first language, and 32% French. So the weighted average for Belgium in Table 1 was calculated as $(0.56(1)) + (0.32(3))/(0.56 + 0.32) = 1.73$.

Note these must be considered conservative measures of linguistic similarity, and do not take into account vocabulary or cultural influences: for example, this classification considers French no more similar to English than Farsi, even though there are many borrowings between the two European languages. Such genetic measures, however, conform more closely (than measures of lexical overlap) to the structural similarity that is the basis of the Sapir-Whorf hypothesis.

The *language of survey administration* for all 50 countries was taken from Hofstede (1980). The *dominant language* for each of the 50 countries was deter-

Table 1. Linguistic Distance (LingDis) from English for 51 cultures of Hofstede (1990)

Country	Primary Language	Secondary Language	Measure (wt.avg)	Country	Primary Language	Secondary Language	Measure (wt.avg)
Argentina	Spanish		3	Korea	Korean		4
Australia	English		0	Malaysia*	Malay		7
Austria	German		1	Mexico	Spanish		3
Belgium*	Flemish	French	1/3(1.7)	Netherlands	Dutch		1
Brazil	Portuguese		3	New Zealand	English		0
Canada*	English	French	0/3(0.9)	Norway	Norwegian		2
Chile	Spanish		3	Pakistan	Panjabi	Sindhi	3/3(3)
Columbia	Spanish		3	Panama	Spanish		3
Costa Rica	Spanish		3	Peru	Spanish		3
Denmark	Danish		2	Philippines*	Tagalog	Cebuan	7/7(7)
El Salvador	Spanish		3	Portugal	Portuguese		3
Ecuador	Spanish		3	Singapore*	Taiwanese		6
Finland	Finnish		4	South Africa*	Afrikaans	English	1/0(0.6)
France	French		3	Spain	Spanish		3
Germany	German		1	Sweden	Swedish		2
Great Britain	English		0	Switzerland*	German	French, Italian	1/3(1.6)
Greece	Greek		3				
Guatemala	Spanish		3	Taiwan	Taiwanese		6
Hong Kong	Cantonese		6	Thailand	Thai		7
India*	Indo-Aryan	Dravidian	3/5(3.7)	Turkey	Turkish		4
Indonesia	Bahasa	Javanese	7/7(7)	US	English		0
Iran	Farsi		3	Uruguay	Spanish		3
Ireland	English		0	Venezuela	Spanish		3
Israel	Hebrew		5	Yugoslavia	Serbo-Croatian	Slovenian	3/3(3)
Italy	Italian		3				
Jamaica*	Creole		1	Arabic countries	Arabic		5
Japan	Japanese		4				

* Language ambiguos countries = a substantial portion of the population is bilingual

mined from the comprehensive catalog of human languages provided by Grimes (1992), a successor to catalogs prepared since the 1930's to aid translation of religious materials. The World Wide Web version of the catalog was used to look up the most popular language, as well as the secondary one when no language was listed as the first language for at least 75% of the population.

The three multi-country regions reported in Hofstede (1980) proved problematic. For the region comprising seven "Arab-speaking countries," the dominant language (and secondary language, if any) was assumed to be a dialect of Arabic. However, the two African regions were dropped because of extreme language heterogeneity, leaving a total sample size of N=51. In ten of the countries the language (i.e., English) of the survey instrument did not correspond to the dominant native language – an important issue considered in the section after the next.

Cultural Values (ValsDif)

For Test I the scores for individualism/collectivism (IND), power distance (PDI), uncertainty avoidance (UAI), and masculinity/femininity (MAS) as collected and reported by Hofstede (2001) are used. The sample consisted of IBM employees worldwide.

Test II employs the IND, PDI, UAI, and MAS scores reported by Hoppe (1990) in his 19-country replication of Hofstede. The sample consisted of alumni of executive programs.

Test III incorporates scores for nine managerially relevant values (they use the terms "society should be") reported by House et al. (2004) for sixty-two countries. The respondents were middle managers in some 825 companies.

Test IV considers a measure of collectivism. Campbell, Graham, Jolibert and Meissner (1988) had groups of businesspeople (i.e., MBA students and/or participants in executive programs, all with at least two years work experience, average age 35) complete questionnaires including the Rokeach (1973) Values Scale. Since then similar data have now been collected from more 1000 businesspeople (average age = 34.8) representing sixteen cultural groups (the United States, anglophone Canada, francophone Canada, Mexico, Brazil, the United Kingdom, Germany, France, the Czech Republic, Russia, northern and southern China, Hong Kong, Taiwan, the Philippines, and South Korea). A factor analysis (varimax rotation) of the 36 values measured in the Rokeach Values Scale (RVS) produced nine factors. The first factor accounted for 29% of the variance and included four values – a world at peace, a world of beauty, family security, and national security. These four items from the RVS were combined (Cronbach's alpha = 0.81) to yield a measure of Collectivistic Values.

In all four tests the difference (or distance) in values for each dimension of values was calculated by taking the absolute value of the difference between the score reported for country X and the average score for the five English speaking

countries. For example, in Test I the difference in Hofstede's IND for Argentina (from the English speaking countries) would have been the absolute value of 46-[(90 + 89 + 70 + 79 + 91)/5] = 38.

Survey Administered in English as a Second Language (ESL)

In Test I to control for a potential confound, the model considers the aforementioned impact of survey instruments being administered outside the respondents' first languages. For 10 of the 50 countries of Hofstede (1980), the questionnaires were administered in English despite it being the first language of only a small minority of the populations: Hong Kong, India, Indonesia, Jamaica, Malaysia, Pakistan, Philippines, Singapore, South Africa and Taiwan (Hofstede 1980, p. 62, Grimes 1992). A dummy variable was therefore created with these ten countries coded as 1 and all others as 0.

Analyses

Tests I and II

For the first two tests the data were analyzed using EQS (Bentler 1995), which implements the Bentler-Weeks general-purpose model of linear structural relations. The testing was done using the original model shown earlier in Figure 1, as well as a series of modified models. EQS was set to perform maximum likelihood analysis on a covariance matrix obtained directly from the raw data. In cases where the solution did not initially converge, the analysis was instead performed using the correlation matrix, which provides better estimates of start values at the expense of statistical interpretation (Bentler 1995). In all cases, the correlation analysis converged to a solution, and the solution's coefficients were used to provide start values for a second covariance matrix analysis.

The results reported are for the fifty-country and one region (i.e., Arabic) data set as represented in Table 1. Table 2 includes the descriptive statistics and correlation matrix for these data. The n = 51 results well represent the parameter estimates and goodness of fit statistics yielded from the several alternative analyses described below.

Alternative Analyses for Test I

Similar results were also obtained testing the models with subsets of the data. Additional analyses were performed for those countries where it was possible to substitute measures of UAI (N=40) and MAS (N=38) adjusted by Hofstede

Table 2. Means, Standard Deviations, and Pearson Correlations (n = 51).

Variables	Code	Means	s.d.	1	2	3	4	5
1. Individualism diff.	IND	40.7	24.4					
2. Power distance diff.	PDI	26.9	18.4	0.69				
3. Uncertainty avoidance	UAI	28.3	17.9	0.45	0.28			
4. Masulinity diff.	MAS	17.8	15.0	0.00	−0.19	0.17		
5. Linguistic distance[a]	LingDis	3.01	1.90	0.62	0.63	0.12	0.08	
6. Second language testing[b]	ESL	0.22	0.42	0.31	0.29	−0.31	−0.25	0.46

[a] Coded in the range 0–7, where 0 = English speaking and 7 = greatest distance from English
[b] Coded 1 if administered in a language other than the national language(s), 0 otherwise

(1980) for the likely confounds he mentions in his book. Hofstede (1980) also provides separate scores for two Belgian and Swiss sub-cultures each so that a test could be performed with n = 53. Finally, a sub-set of the data was tested with the nine language ambiguous countries (where a substantial percentage of the population is bilingual) listed in Table 1 eliminated so that n = 42. Comparable results were also produced by the use of alternative statistical estimation methods: correlation analyses; ordinary least squares (OLS), generalized least squares (GLS), and Latent Variable Partial Least Squares (PLS). As a distribution-free estimation method, PLS is particularly appropriate for data that comes from non-normal distributions and less than interval level data (Falk/Miller 1992). The convergence of the results for the EQS and PLS analyses can be seen with reference to the last two columns in Table 3.

Table 3. Hypothesis Tests with Alternative Focal Languages (PLS Parameter Estimates).

	Focal Language					
Parameter	**Chinese**	**French**	**Hebrew**	**Japanese**	**English**	**English[a]**
Theory						
LingDis → ValsDif	−0.29*	0.49*	0.58*	0.50*	0.67*	0.71*
R^2	0.08	0.24*	0.34*	0.25*	0.45*	0.51*
Measurement (LV loadings)						
Individualism	0.52	−0.22	0.68	0.29	0.93	0.91
Power Distance	0.22	0.46	0.71	0.74	0.90	0.77
Uncertainty Avoidance	0.0	0.98	0.46	0.81	0.49	0.62
Masculinity	0.89	0.17	−0.34	0.18	−0.02	–
Model Fit						
RMS cov (E,U)	0.05	0.09	0.08	0.03	0.09	–

[a] EQS parameter estimates for model represented in Figure 1
* $p < 0.05$

Tests III and IV

While the measures used in Tests I and II overlap conceptually with those used in Tests III and IV, the latter are relatively new and a more exploratory analysis approach is appropriate. Therefore, the associations between linguistic distance and the values differences represented in the House et al. (2004) and Campbell et al. (1988) data are examined using correlation analysis. Also, rather than modeling the nine dimensions of values defined in the House et al. study as separate indicators of ValsDif, we instead considered the nine summed and then individually.

Results

Test I – Model Testing and Revision

The 51-country data set fit the proposed model (Model A) poorly – $\chi 2 = 33.2$, CFI = 0.75, and NNFI = 0.53. To improve the fit, the original model was modified using Lagrange Multiplier (LM) tests of path significance, which have been shown to be asymptotically equivalent to Chi-square difference tests and Wald tests (Chou/Bentler 1990). To the original model, the LM tests recommended adding a direct path from ESL to UAI, and weak path coefficients showed that the ESL/ValsDif path should be dropped. This new model (Model B – see Figure 1) yields the following statistically significant ($p < 0.05$) parameter estimates: LingDis/ValsDif = 0.71; ESL/UAI = −0.52; ValsDif/IND = 0.91; ValsDif/PDI = 0.77; and ValsDif/UAI = 0.62. The ValsDif/MAS coefficient was not statistically significant.

Assessment of Model Fit

The revised model (B) produced $\chi 2 = 4.49$, CFI = 1.00, and NNFI = 0.99, confirming an excellent fit (Bentler/Bonnet 1980). Model B is consistent with the theory behind the original model, with one exception – the second language (ESL) measure is related only to UAI and not to all three of the remaining indices. That is, only UAI seems to have been affected by respondents completing the survey in their second language (English). You will recall that for ten of the original countries the questionnaire was not translated. Given that the CFI penalizes small sample sizes, a CFI = 1.0 and an NNFI = 0.99 must be taken as strong (and conservative) confirmation of the statistical validity of the revised Model B.

Test II – Model Replication

Developing an exploratory structural equation model raises issues of *post hoc* comparison for which the best remedy is fitting the model to another independent sample. The only many-country (i.e., $n > 4$) replication of Hofstede's survey published thus far is that of Hoppe (1990), which studied the alumni of a European executive education program.

As Hoppe noted, there are significant problems of comparability between his and Hofstede's sample. His sample reflected an educational elite (rather than middle managers, clerical and technical employees in the IBM study) which included participants from academia, government, business and non-profit organizations; respondents were limited to 18 European countries and the US. His instrument followed Hofstede's recommended changes and thus the questions and formulas used to calculate the IDV and MAS scores were not identical to Hofstede's. For these reasons, it is not reasonable to assume metric equivalence for the models in this study between Hofstede and Hoppe's sample. Also, Hoppe administered his survey in English, which meant that respondents from most countries were taking the survey in a second language.

The two models (A and B) were tested again using Hoppe's published data, with ESL = 0 for Britain, Ireland and the US, and 1 for all others. The data did not fit model A, but did model B ($\chi 2 = 1.48$, CFI = 1.0, NNFI = 1.38). However, only two paths were statistically significant ($p < 0.05$) in model B, LingDis/ValsDif = 0.66 and ValsDif/PDI = 1.00.

Interpretation is limited by the small sample size ($N = 19$) and the representativeness of Hoppe's elites of their countries or the world at large. However, where the common factor using Hofstede's data set was a proxy for individualism (explaining 82% of its variance), using Hoppe's data set it was a proxy for PDI (explaining 100% of its variance). Overall, the two models were comparable in explaining the variance in the values dimensions. Model B was thus a statistically valid representation of the variation in both Hofstede's and Hoppe's data sets.

Test III – Nine Managerial Values

House et al. (2004) have reported preliminary country scores (i.e., unadjusted for cultural response bias) for nine managerially relevant values for sixty-one countries. LingDis is correlated with the nine ValsDif scores summed ($r = 0.41$, $p < 0.05$, $n = 61$) and four of them individually: Uncertainty Avoidance ($r = 0.53$, $p < 0.05$); Gender Egalitarianism ($r = 50$, $p < 0.05$); Assertiveness ($r = 0.26$, $p < 0.05$); and Future Orientation ($r = 0.30$, $p < 0.05$). When we

eliminate the Language Ambiguous Countries from the data set (i.e., reducing the sample to $n = 49$) the statistically significant relationships are similar: nine ValsDif scores summed ($r = 0.48$, $p < 0.05$); Uncertainty Avoidance ($r = 0.61$, $p < 0.05$); Gender Egalitarianism ($r = 0.59$, $p < 0.05$), and Collectivism 1 ($r = 0.26$, $p = 0.068$).

Test IV – Rokeach and Collectivisitic Values

Using the Campbell et al. (1988) data the LingDis measure was found to be correlated with the ValsDif measure of Collectivistic Values using 4 Rokeach items, as expected, at both the individual level of analysis ($r = 0.19$, $p < 0.05$, $n = 866$) and at the group level ($r = 0.76$, $p < 0.05$, $n = 16$). When the three language ambiguous groups (i.e., both Canadian groups and the Philippines) were eliminated from the data set the strength of these relationships improved slightly ($r = 0.21$, $p < 0.05$, $n = 661$ and $r = 0.76$, $p < 0.05$, $n = 13$).

Additional Tests with Other Focal Languages

In Tests I through IV the focal language was English. To explore the generality of our findings four additional sets of relationships were examined using in turn Chinese, Hebrew, and Japanese as the focal languages. The LingDis measure was recalculated starting with the branch holding each of the four languages in turn producing DFC (i.e., Distance From Chinese), DFF, DFH, and DFJ. The ValsDif scores were calculated by taking the absolute values of the differences in the each of the four Hofstede scores for Country X and France, etc. For example, the IDV for Chile related to France is $|71-23| = 48$, and for Chile related to Japan PDI = 9, etc. For the Chinese test, perhaps wrongly, the ValsDif scores were calculated by averaging Hofstede's scores across Hong Kong, Taiwan, and Singapore, the three Chinese-speaking countries in his data.

The relationships LingDis/ValsDif relationships were then tested using Partial Least Squares (PLS) analysis and those results are reported in Table 3. PLS is more appropriate than EQS for these additional analyses given their more exploratory nature. However, the reader will notice that similar results are produced across the two analytic approaches – compare the last two columns in Table 3.

Three of the four parameter estimates are supportive of our theory ($p < 0.05$): 0.49 for French, 0.58 for Hebrew, and 0.50 for Japanese. The hypothesis is not supported for test using Chinese as the anchor language (the parameter estimate turned negative at -0.29).

Discussion

We have tested the hypothesized relationship between linguistic distance and differences in values across four different sets of survey data collect from thousands of experienced business people worldwide. In all cases we have found that as linguistic distance from English increases, so do the differences in managerial values scores between English speaking countries and countries where other languages are spoken. We have applied the most rigorous kind of statistical analyses (i.e., EQS) to compare a new measure of linguistic distance to Hofstede's (1980) four dimensions of values using his original data set and that of the best replication available (Hoppe 1990). In both tests linguistic distance explains more than 40% (i.e., for both the parameter estimates of the LingDis → ValsDif link exceeded 0.65) of the variation in the differences in values across countries. Moreover, these results proved robust across a variety of subsets of the data and using alternative statistical approaches.

In two more exploratory tests with the House et al. (2004) data and the Campbell et al. (1988) data correlation analyses further demonstrated the validity of the language/values association ($r = 0.41$ for House et al.; $r = 0.19$ for individuals and $r = 0.76$ for countries in the Campbell et al. data set).

We have also examined the hypothesized link using Hofstede's data (1980), but with four languages other than English as focal points. Our results show the association again for French, Hebrew, and Japanese, but not Chinese. That is, as the linguistic distance from French increases so do the differences from Hofstede's values compared to French speakers, and so on. The discrepancy in the test using Chinese as the focal language is most likely due to the heterogeneity of the values scores of Chinese speaking countries in Hofstede's sample. Hong Kong, Taiwan, and Singapore are quite diverse and have been influenced to varying degrees by British colonialism; so averaging his values scores across the three makes little sense. We had no such averaging problem for French, Hebrew, and Japanese as these are primary languages in only one country each in his data set. Ultimately one might analyze the LingDis/ValsDif relationship using for the Hofstede (1980) data all possible relationships between countries or a sample size of $n = 51 \times 51 = 2601$ similar to Chen et al. (1995).

Thus, our analyses provide strong support for the association between language spoken and managerial values. Differences in managerial values across countries are consistently and in large degree explained by differences in languages spoken. So, at least the weak form of the Sapir-Whorf (1921, 1940) hypothesis is supported – that is, language appears to influence thinking.

The Usefulness of the Concept of Linguistic Distance

Whether the relationship between values dimensions and language is correlative or causal, the second major finding suggests that linguistic distance provides a valuable measure of cultural distance. As evinced by the increasingly frequent citations of Hofstede in the management literatures, his indices are an important basis of cross-cultural research. The advantage of our proposed linguistic distance measure is that unlike behavioral or attitude surveys it can be readily obtained for most nations and micro-cultures, so cross-cultural researchers are not limited to the 53 countries and regions studied by Hofstede.

The proposed linguistics-based measure requires measuring dissimilarity from an *a priori* specified anchor language. This will not be a problem for studies where there is a clearly central language for methodological reasons (as in this case) or theoretical reasons (e.g., studies of communication networks within a MNC with an identifiable dominant language).

Finally, the construct of linguistic distance introduced here has demonstrated good nomological validity characteristics. It appears to be related to employee and manager values and behaviors as measured in four separate databases and at both the country/culture and the individual levels of analysis. All this suggests that a key predictor of employees' or managers' values and behaviors is the language they speak. Moreover, when the Language Ambiguous Countries are eliminated from the data sets relationships are almost always strengthened. This suggests that second languages learned (e.g., English in India) may also influence values and behaviors.

Limitations

The modeling techniques used for this secondary data analysis have their own inherent limitations. Ullman (1996) notes that model modification changes structural models from confirmatory to exploratory data analysis, and that statistical controls are not yet available (*a la* Scheffé or Tukey corrections in ANOVA) for such *post hoc* comparisons. Thus, although widely used, model modification has been criticized for inflating the Type I error rate and thus modified models need to be confirmed with a second sample (Kaplan 1990). We have tried to reduce the risks here by replicating the test with the other data sets, but more work needs to be done in this area.

Of course, causality is an issue that cannot be directly addressed in our cross-sectional design using secondary data. Perhaps additional research with bilinguals may produce better insight into the extent of the language/values association and its causality.

Directions for Future Research

The linguistic distance measure we present here might be further refined by taking into account other aspects of language evolution. As mentioned earlier, English has certainly borrowed heavily from the romance languages (i.e., Latin), as has Japanese and Korean from Chinese. Yet these commonalities are not considered directly in our measure. The positive results reported here, using the simplest measure of linguistic distance, suggests that additional work with linguists may prove fruitful. Other measures of linguistic distance can also be developed – two we can think of are (1) the number of hours required to learn language X in US State Department training courses and (2) the relative complexity of computer key boards for other languages relative to English which is the simplest.

Several avenues of research in management contexts deserve attention. Perhaps the most immediate potential applications of the linguistic distance construct are in the management and structure of international operations. For example, it should be anticipated that the usefulness of organizational designs, incentive programs, and other management processes developed in English speaking countries will vary with the linguistic distance from English of the foreign culture in which they are applied.

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