It's around here: Residential history and the meaning of 'Midwest'

Vsevolod Kapatsinski (vkapatsi@uoregon.edu)
Department of Linguistics, 1290 University of Oregon
Eugene, OR 97403 USA

Richard Janda (rjanda@indiana.edu)
Department of Linguistics, Indiana University
Bloomington, IN 47401 USA

Abstract

Even speakers of American English who think they grew up in the Midwest do not agree on its boundaries. So what determines the meaning of 'Midwest' to a given speaker? We argue that the meaning of a geographical term like 'Midwest' is based in part on one's experience with locations that one knows to be part of the region. This exemplar-based knowledge causes the perceived location of the Midwest to shift depending on where in the Midwest a respondent has lived and to remain fixed in space over time despite changes in features of exemplar locations. Nonetheless, regression analyses suggest that exemplar knowledge, when available, coexists with more abstract definitional knowledge. We believe that empirical studies of meanings of geographical terms can shed light on the nature of human semantic categories and the role of specific exemplars in semantic representation.

Keywords: Semantics, cognitive maps, exemplar models, vernacular regions, perceptual geography.

Introduction

Every American English speaker has heard of the Midwest. It is visited by politicians, discussed by pundits and weather forecasters, and even appears commonly in cognitive science articles on "students at a Midwestern university". Yet, the location of the region is surprisingly elusive. The question we ask is what determines the location of the Midwest for a particular speaker. Why does the meaning of 'Midwest' vary across speakers and what factors account for this variation?

The classical approach to lexical semantics, dating back to Aristotle, has maintained that word meanings can be defined using necessary and sufficient conditions. According to this view, semantic categories have distinct boundaries. This, at the time dominant, view of semantics was explicitly challenged in the seventies by several linguists and psychologists, including Labov (1973), McCloskey & Glucksberg (1978), and Rosch (1973), who showed that category boundaries of natural concepts can be fuzzy. For instance, Labov (1973) found that there is no agreed-upon ratio of width to height at which cups become mugs. McCloskey & Glucksberg (1978) demonstrated that uncertainty about category boundaries can also hold within speakers. These studies have been extremely influential in initiating a shift from feature-based descriptions of semantic categories to exemplar, prototype, and connectionist models (see Murphy 2002, Taylor 1995 for reviews).

In recent work, it has become apparent that categories vary in the fuzziness of their boundaries depending, in particular, on whether the category consists of artifacts or organisms (Diesendruck & Gelman 1999, Estes 2003). We believe that the range of lexical meanings under discussion in the psychological and linguistic literatures has been unduly restricted. Differences between categories of organisms and categories of artifacts are interesting but difficult to explain because organisms differ from artifacts in a myriad ways.

An interesting additional class of concepts to consider is the class of locations/regions, such as "the Midwest", or "the neighborhood". Categories of locations vary greatly in how they are acquired and defined, with some having clear boundaries (e.g., the United States), and others having very fuzzy ones (e.g., the Midwest). Thus, boundary fuzziness is not a property of domains (*pace* Diesendruck & Gelman 1999 and Estes 2003) but rather a property of individual concepts, likely due to how these concepts are acquired and how much hinges on getting the boundary right. If a category is acquired completely implicitly through the accumulation of exemplars, its boundaries are likely to be fuzzy, whereas a category that is learned by memorizing a definition *can* have clear boundaries (as long as the defining attributes of the category are easily identifiable, cf. Armstrong et al. 1983). Furthermore, multiple sources of knowledge can combine, resulting in a concept that is neither completely exemplar-based nor completely feature-based. We argue that the meaning of "Midwest" for a given listener can be influenced by his/her experience with specific exemplar Midwestern locations, the literal interpretation of the word, and the official definition of the region. Geographical terms offer distinctive advantages in exploring the relationship between experience and concept formation because people are aware of the locations they have lived in and can easily describe them (unlike the specific artifacts or organisms they have seen).

While never discussed in linguistics or psychology, the perceived locations of geographical regions have been studied by cultural geographers, starting with Brownell (1960). Jordan (1978: 293) defines perceptual or vernacular regions as "those perceived to exist by their inhabitants and other members of the population at large… Such regions are

composites of the mental maps of the population." Brownell (1960) and Shortridge (1985, conducted in 1980) studied the perceived location of the Midwest by asking postmasters in and around the traditional Midwest (Brownell) and college students across the United States (Shortridge) to mark the Midwest on a map, the method we also rely on.

Methods

Each student in our introductory linguistics classes was asked to distribute blank maps of the 48 contiguous states with state boundaries to three of his/her acquaintances. They were asked to only distribute the materials to native English speakers who grew up in the US. The respondents were asked: "Write an M in any state that is *at least partly* in the Midwest; then circle any of these M's that are in a state which is *completely* in the Midwest." The students were instructed to give the same instructions to all respondents and to avoid being drawn into a discussion of where the Midwest is (supposed to be). After a respondent has marked up their map (and possibly list of states), the students collected from them states s/he has lived in for more than a year and the state(s) s/he grew up in.

Complete datasets were collected from 470 acquaintances of students at Indiana University and 458 acquaintances of students at the University of Oregon. We were concerned that the observed variation may to some extent be due to the respondents being unable to locate states on a map. Therefore 294 Oregon respondents were presented with both a map and an alphabetic list of states (formatted in two columns). Some (N=163) respondents filled out the map first, while others (N=131) filled out the list first. Each student was instructed to use each order of presentation with at least one respondent. The data were analyzed using R (R Core Development Team, 2008). The maps are generated using the 'maps' package in R.

Where Should the Midwest Be?

The Official Midwest

Officially, the Midwest has clear boundaries, which are defined by the Census Bureau as shown in Figure 1 (http://www.census.gov/geo/www/us_regdiv.pdf).

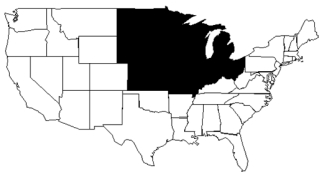

Figure 1: The official definition of Midwest according to the US Census Bureau.

The Self-Identified Midwest

Reed (1976) introduced the idea of locating perceptual regions by searching telephone directories of various cities for businesses named after the region (e.g., *Midwest Auto Body*), which was applied to the Midwest by Zelinsky (1980). The crucial assumption is that there is no reason to name a business, e.g., *Midwest Plumbing*, if one does not believe it to be located in the Midwest.[1] This provides a way to find a kind of "ground-truth definition" of the Midwest by locating the places whose inhabitants believe themselves to live in the Midwest, and to determine whether or not this belief is shared by our respondents.

For most states, we took the largest city. For Oklahoma, we took Tulsa rather than Oklahoma City because a suburb of Oklahoma City is called "Midwest City" so using it would have inflates Midwesternness of Oklahoma, which is, in any case, higher than official definitions suggest. In the case of New York and Pennsylvania, we took the western cities of Buffalo and Pittsburgh rather than New York City and Philadelphia because Pittsburgh and Buffalo are suggested by some to be in the Midwest. Nonetheless, New York and Pennsylvania clearly did not fall into the Midwest category. For Texas, we took Dallas, which is closer to the official Midwest than Houston or Austin.

Since larger cities are expected to have more businesses, and some states have larger cities, we needed some way to normalize the counts. We tried three ways: 1) searching for "businesses loc: <city name>" on Google maps (http://maps.google.com), 2) retrieving city population estimates from Wikipedia (http://wikipedia.org), and 3) retrieving the number of businesses containing the name of the city in their name from yellowbook.com. The three ways of normalizing produced similar results (with rank correlations between .92 and .94). The main difference concerns northern plains states that do not have big cities: Montana, Wyoming and the Dakotas. These states receive high Midwesternness scores with normalization by population or number of businesses on Google maps but relatively low scores with normalization by number of businesses containing the city name.

We were able to find a natural cut-off (one that corresponds to a clear break in the distribution) on proportion of business names featuring the word *Midwest* that corresponds quite closely to the official definition of the region, with a few exceptions (Figure 2). One exception is Oklahoma, which is not officially part of the Midwest but appears to belong to the Midwest as much as do Ohio, Kansas or Michigan based on the business directory (also Brownell 1960). The other exception is Kentucky: the major city of Kentucky, Louisville, is just across the river from officially Midwestern Indiana, and clearly seems to consider itself as much a part of the Midwest as does Detroit, which is officially in the Midwest. Taking the converse perspective, Midwestern identity appears to be much less prominent in Michigan and Ohio than in more western states of the official Midwest (in agreement with Zelinsky 1980). These data already suggest that the boundaries of the Midwest are fuzzier than they appear on the Census map. As Midwesterners settle the neighboring regions, they bring the

[1] We are assuming that the prestige of all things Midwestern is not high enough for those outside of the Midwest to pursue an aura of Midwesternness in naming their businesses.

Midwest with them, expanding the region whose inhabitants think of themselves as being in the Midwest.

Figure 2: Left: Proportion of businesses with *Midwest* in the name relative to the number of business names containing the local city name (YellowBooks nromalization). These are the scores we used in regressions. Right: The smallest set of states with the highest proportion of *Midwest* names that includes all officially Midwestern states.

Midwest for Hoosiers

Figure 3 shows the data for our Indiana respondents (Hoosiers). More than 90% of the respondents agree that Indiana and Illinois are at least partially in the Midwest. Agreement rates are much lower for the other states, indicating a high degree of variation: the Midwesternness rate is 70% for Ohio, Missouri and Iowa, 60% for Michigan and Wisconsin, and 50% for Kentucky, which officially does not belong to the Midwest (though, according to our business directory data as well as Brownell 1960, its inhabitants that live near the Indiana border appear to disagree). The other officially Midwestern states have even lower Midwesternness scores. Thus the meaning of *Midwest* for Hoosiers does not correspond to the official definition of *Midwest* and appears to center on Indiana, which the respondents know to be in the Midwest.

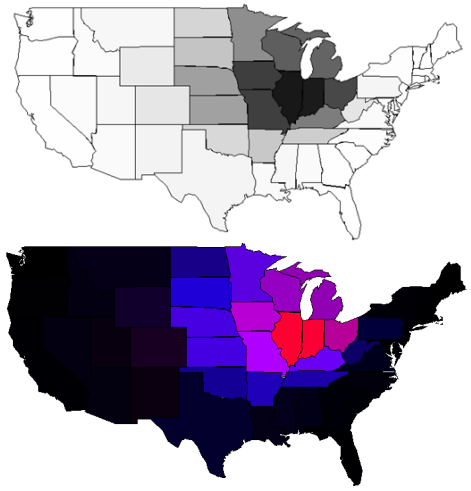

Figure 3: The Midwest for Hoosiers. Top: taking 'partially in the Midwest' = 0.5, 'completely in the Midwest' = 1, 'not in the Midwest' = 0. Bottom: Red = "completely in the Midwest"; Blue = "only partially in the Midwest"; Black = "not in the Midwest".

Residential History Effect

Figure 4 compares the meanings of *Midwest* for those who have grown up in Indiana (N=284), Illinois (N=51), and Ohio (N=13). Comparing those who grew up in Illinois to those who grew up in Indiana, we can note that the states that border Illinois but not Indiana (Iowa, Missouri and Minnesota) are darker/more Midwestern for respondents who grew up in Illinois while Ohio and Kentucky, which border Indiana but not Illinois, are considered more Midwestern by those who grew up in Indiana. Ohioans, who come from the very east of the Midwest, have a rather different notion of the Midwest in that the most prototypical Midwestern states for them are Indiana and *Ohio* rather than Illinois, unlike for those who grew up in Illinois or Indiana. Western Midwest states, like Iowa and Missouri are assigned to the Midwest by Ohioans much less often than by Hoosiers and especially Illinoisans.

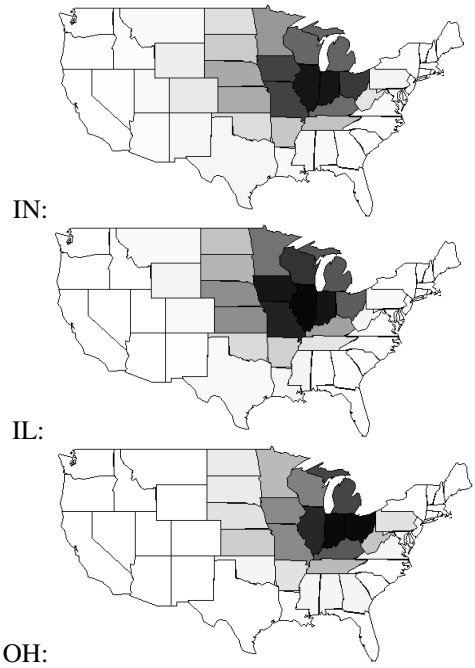

Figure 4: The Midwest for Hoosiers who have grown up in Indiana (IN), Illinois (IL), and Ohio (OH).

We can test the effect of residential history on the meaning of Midwest by comparing perceived differences in Midwesternness between states that are around the respondents' residences. Thus, we ask: if residential history had the expected effect, which states would be more likely to be assigned to the Midwest by, for instance, Ohioans compared to Illinoisans and which ones would be more likely to be assigned to the Midwest by Illinoisans? For Ohioans we took this to be Ohio and the states that are adjacent to Ohio but not Illinois while for Illinoisans it would be Illinois and states that are adjacent to Illinois but not Ohio. Then we can compare Ohioans to Illinoisans on the differences in perceived Midwesternness scores between

states expected to be more Midwestern for Illinoisans and states expected to be more Midwestern for Ohioans: $(MWness_{\{IL;MO;IA;MN\}}\text{-}MWness_{\{OH;MI;WV;PN\}})_{IL}$ - $(MWness_{\{IL;MO;IA;MN\}}\text{-}MWness_{\{OH;MI;WV;PN\}})_{OH}$. For Ohio vs. Illinois, we obtain $t(17)=6.22$, $p=.000008$; for Indiana vs. Illinois, we obtain $t(86)=5.44$, $p=.0000005$; for Ohio vs. Indiana, $t(13)=3.52$, $p=.004$. This provides strong evidence for the hypothesis that one's notion of the Midwest depends on where in the Midwest one has lived.

Modeling Midwesternness

We modeled Midwesternness of a state as judged by Hoosiers using a linear combination of 1) whether the state is officially in the Midwest, 2) the proportion of businesses that have *Midwest* in the name; 3) overlap with the middle third of the West (Mississippi to the West Coast) of the US in the East-West direction; 4) overlap with the middle third of the West in the North-South direction; 5) for officially Midwestern states, the number of respondents who have lived in the state; and 6) for states that are either officially Midwestern or neighboring a Midwestern state, the number of respondents who have lived in adjacent officially Midwestern states. The regression accounts for 94% of the variance in scores among states. Predictors having to do with the official and "ground truth" notions of the Midwest (1, 2) are highly significant: $t(1,41)=5.15$, $p<.00001$ and $t(1,41)=3.7$, $p=.0006$ respectively. Overlap with the middle of the West is relatively unimportant: East-West centrality has no significant effect ($t(1,41)=-1.21$). North-South centrality tends towards significance but is at most a minor effect ($t(1,41)=1.96$, $p=.056$).

The residential history variables (5, 6) are very important, improving the predictiveness of the model ($F(2,41)=46.31$, $p=.00000000004$) from 79% of the variance accounted for to 94% ($t(1,41)=4.64$ and 8.34 respectively, both $p<.0001$). These results confirm the strong influence of residential history on whether or not a state is assigned to the Midwest: officially Midwestern states tend to be assigned to the Midwest if the respondent has lived in that state; officially non-Midwestern states may be assigned to the Midwest if the respondent has lived in a neighboring Midwestern state. Importantly, replacing the number of respondents that have lived in neighboring Midwestern states with an indicator of whether or not the state neighbors officially Midwestern states does not work as well (the resulting model accounts for 80% of the variance, barely more than the 79% accounted for by the model that does not include the "is the state neighbor to Midwestern states" variable).

Again, the location of the Midwest for Midwesterners is based on where in the Midwest they have lived. It is also encouraging that our objective measure of state Midwesternness contributes to explaining the subjects' judgments: their judgments appear to be based not simply on the official definition of the Midwest but are also in agreement with the "ground truth", which the respondents may discover in their interactions with people from various locations at the edges of the official Midwest and in their travels on the edge of the Midwest. The map predicted by our model is shown in Figure 5. As seen in Figure 5, residential history is especially helpful in predicting the high Midwesternness of Kentucky and Indiana and the relatively low scores for states in the west of Midwest.

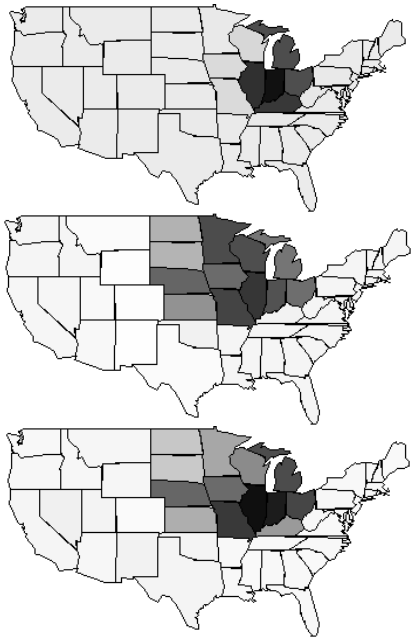

Figure 5: The Midwest for Hoosiers as predicted by residential history of the respondents alone (top), the other predictors alone (middle) and the full regression model (bottom).

Midwest for Oregonians

What then would one's notion of the Midwest be like if one has not lived in the Midwest? Figure 6 shows what the Midwest means for Oregonians. Oregon, being on the West Coast, is not considered to be part of the Midwest by Oregonians (Portland, the main city of Oregon, has no businesses with *Midwest* in the name). Figure 6 shows data both for subjects who were presented with a blank map (like the Hoosiers) and those presented with a list of states (in alphabetical order). The maps are markedly different from the ones obtained for Hoosiers: the entire Midwest is shifted west, with the most Midwestern state being Iowa, rather than Illinois or Indiana. The much flatter distribution of darkness across states indicates lower certainty about which states are vs. are not part of the Midwest. Both uncertainty and the westward shift are especially high for respondents who have not lived in the Midwest. The results do not appear to result from the respondents being unable to locate states on the map because respondents presented with a list show qualitatively very similar behavior. The maps are almost identical to the one reported by Shortridge (1985) for New Yorkers. Thus the westward shift appears to be characteristic of non-Midwesterners, rather than West-Coasters.

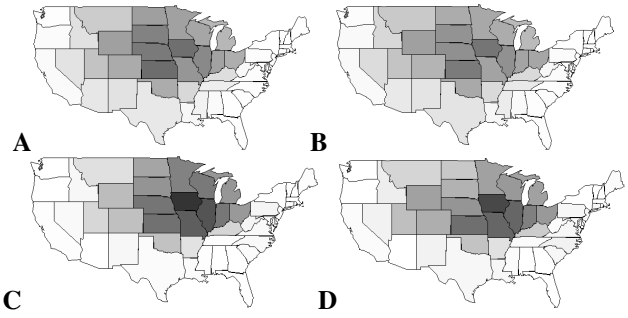

Figure 6: The Midwest for Oregon respondents who have not lived in the Midwest (A-B) and Oregon respondents who have lived in the Midwest (C-D). Data from map marking (A, C) and list marking (B, D).

The location of the Midwest for an Oregonian who has lived in the Midwest also depends on where in the Midwest s/he has lived. The fit of the linear regression model is improved from an R^2 of 88% to 96% by inclusion of the residential history variables ($F(2,41)=20.07$, $p=.0000008$). However, the alternative model that excludes residential history but includes whether or not a state borders officially Midwestern states accounts for 94% of the variance in the Oregonian data, suggesting that the role of residential history for the Oregonians is, though significant ($F(1,41)=18.4$, $p=.0001$), relatively minor, compared to the role of residential history for Midwesterners (accounting for 2% vs. 14% of the variance).

The official location of the Midwest is influential for Oregonians ($t(1,41)=4.78$, $p=.00002$ for all Oregonians, $t(1,41)=6.71$, $p=.000006$ for those who have lived in the Midwest), like for Hoosiers. However, unlike in the Indiana data, there is a tendency to locate the Midwest in the middle of the West, especially for Oregonians who have not lived in the Midwest (overlap with middle third of the region East to West, $t(1,41)=5.37$, $p=.000003$ for all Oregonians; $t(1,41)=2.53$, $p=.015$ for those who have lived in the Midwest; North to South, $t(1,41)=4.06$, $p=.0002$ for all Oregonians, $t(1,41)=4.56$, $p=.00005$ for those who have lived in the Midwest). Finally, Oregonians who have not lived in the Midwest do not display sensitivity to the "ground truth" definition of the Midwest ($t(1,41)=2.08$, $p=.04$ for Oregonians who have lived in the Midwest, $t(1,41)=1$, $p=.32$, n.s. for all Oregonians). Thus, only those who have lived in the Midwest are sensitive to whether residents of places at the edges of the official Midwest consider themselves a part of it.

Unlike for Hoosiers, there are distinct groups of Oregonians with different Midwests. Individual differences among them are well described by a single principal component, which shows distinct clustering (Figure 7). Respondents low on the principal component seem to interpret the Midwest as the middle of the West, the vast majority of Oregonians treat all states that are not on a coast or in the Old South as being Midwestern, while a small minority are in agreement with where the Midwest is "supposed to be".

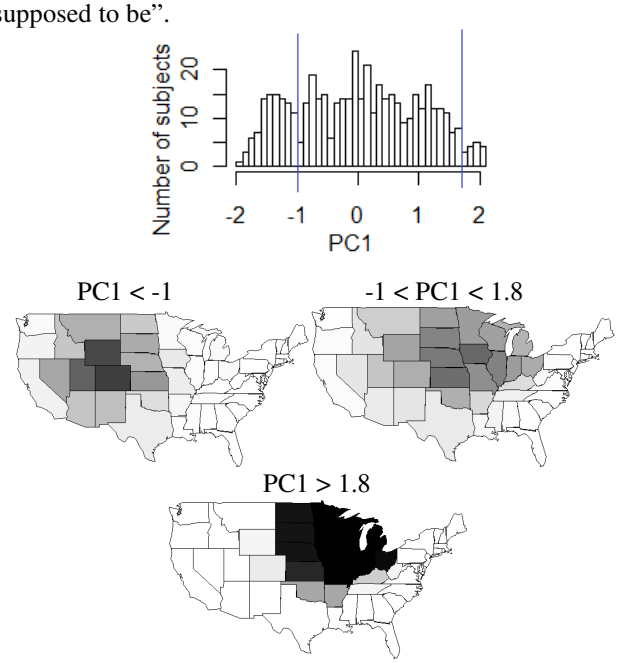

Figure 7: Top: Oregonians fall into distinct groups of respondents. Some locate the Midwest in the middle of the west, some off the coast, and some where it is officially.

The Changing Midwest

While not drawing attention to the cognitive implications of the findings, Shortridge (1985) addressed the location of the Midwest using similar methods (by asking college students to circle the Midwest on a map of the US showing state names and boundaries). Like us, Shortridge (1985) observed that the location of the Midwest varies for respondents from different locations. In particular, "Respondents from… Illinois, Iowa, Kansas, Missouri, Nebraska, North Dakota, South Dakota, and Wisconsin saw themselves at the core of the Middle West…" (Shortridge 1985: 50).[2] This is consistent with our finding that the Midwest for a Midwesterner tends to be centered on one's home state.

However, in 1980, "residents of… Indiana, Michigan, and Ohio… included their states within the Middle West region but… accorded equal or greater Middle West status to states farther west. Indiana and Michigan residents indicated that the regional core lay several hundred miles beyond their western borders; Ohio people displaced the core about 500 miles" (Shortridge 1985: 51). This is no longer the case (Figure 4).

Shortridge (1985: 49) attributes the relatively low Midwesternness of Indiana, Ohio, and Michigan to a mismatch between prototypical features of Midwestern locations, rural life and farming, and the relatively high population density and industrialization of the eastern

[2] Cf. also a quote from a Missouri postmaster reported by Brownell (1960: 84): "We resent people from Ohio and Indiana referring to themselves as 'Midwesterners' as actually they are 'Mideasterners'..."

Midwest: "eastern sections became heavily urbanized and industrialized. Rather than changing a valued regional image to fit this reality… people have shifted the regional core westward."[3]

In the past thirty years, the Midwestern identity of home locations has been reasserted for residents of eastern Midwest. This suggests that the features of a prototypical Midwestern location are not as important as the labels attached to the locations one is familiar with. This is expected on an exemplar account of the term's semantics, where it is experience with the features of specific Midwestern locations that gives rise to one's idea of the Midwest. As features of familiar locations known to be part of the Midwest change, the prototypical Midwest changes. The seeds of change are in fact already observable in Shortridge's data: residents of eastern Midwest reported industry to be characteristic of the Midwest while residents of the Great Plains reported the Midwest to be predominantly rural, with outsiders being in between the two groups of Midwesterners (Shortridge 1985: 53).

Conclusion

Geographical terms, like *Midwest*, provide a valuable window on the nature of lexical semantic representations, and should be taken into account by theories of semantics/conceptualization. In particular, they allow the investigator to easily examine the influence of experience with specific exemplars of a category (locations) on the mental representation of the category (region) itself.

The present data suggest that exemplars play a powerful role in semantic representations when they are available. At least for geographical terms (and perhaps, terms that don't have overtly negative connotations), the exemplar category assignments can remain stable across generations while the features of those exemplars change. Stability of exemplar-category mappings coupled with the possibility of change in exemplar features results in changes in prototypical features of the category. In the case of the Midwest, different speakers of English experience very different exemplars of Midwestern locations, resulting in very different notions of where typical Midwestern locations are and what Midwestern locations are like. Speakers are like blind men exploring an elephant: those who are close to the trunk may think an elephant is like a snake while those close to a leg may think it's like a tree.

As important as exemplars are, they are not all there is to the semantic representation of a regional term. Regression analyses indicate that *Midwest* is not completely exemplar-based for any of the speaker populations we studied. Finally, those from outside of the region, lacking experience with exemplars of the Midwest have to rely on interpreting the word literally or on identifying Midwestern locations by matching their perceived features to those thought to be characteristic of the Midwest. This highlights that characteristics of semantic representations can vary drastically even *within* a domain depending on how the concept is acquired. In fact, the meaning of the very same word can be exemplar-based to different degrees for different speakers of the same language.

[3] Note that Shortridge (1985) actually had no evidence for a "shift" since his data were entirely synchronic.

Acknowledgments

Many thanks to the students in Fall 2009 Linguistics 103 at Indiana University, Winter 2010 Linguistics 390 and Spring 2010 Linguistics 150 at the University of Oregon for collecting the data, Prakaiwan Vajrabhaya for assigning the data collection to her class, Grant Smith for coding some of the data, and Melissa Redford for helpful feedback.

References

Armstrong, S. L., L. R. Gleitman, & H. Gleitman. (1983). What some concepts might not be. *Cognition*, *13*, 263-308.

Brownell, J. (1960). The cultural Midwest. *Journal of Geography, 59,* 81-85.

Diesendruck, G., & S. A. Gelman. (1999). Domain differences in absolute judgments of category membership: Evidence for an essentialist account of categorization. *Psychonomic Bulletin & Review, 6,* 338-46.

Estes, Z. (2003). Domain differences in the structure of artifactual and natural categories. *Memory & Cognition, 31*, 199-214.

Jordan, T. G. (1978). Perceptual regions in Texas. *Geographical Review, 68,* 293-307.

Labov, W. (1973). The boundaries of words and their meanings. In C. J. Bailey & R. Shuy (Eds.), *New ways of analyzing variation in English*. Washington: Georgetown University Press.

McCloskey, M. E., & S. Glucksberg. (1978). Natural categories: Well-defined or fuzzy sets. *Memory & Cognition, 6,* 462-72.

Murphy, G. L. (2002). *The big book of concepts*. Cambridge, MA: MIT Press.

R Core Development Team. (2008). *R: A language and environment for statistical computing*. Vienna: R Foundation for Statistical Computing.

Reed, J. S. (1976). The heart of Dixie: An essay in folk geography. *Social Forces, 54,* 925-39.

Rosch, E. (1973). On the internal structure of perceptual and semantic categories. In T. E. Moore (Ed.), *Cognitive development and the acquisition of language.* New York: Academic Press.

Shortridge, J. R. (1985). The vernacular Middle West. *Annals of the Association of American Geographers*, *75,* 45-57.

Taylor, J. R. (1995). *Linguistic categorization: Prototypes in linguistic theory*. Oxford: Oxford University Press.

Zelinsky, W. (1980). North America's vernacular regions. *Annals of the Association of American Geographers, 70,* 1-16.