1. Introduction

The proposed project, “Documentation of Diidxa za spatial language”, is part of University at Buffalo Ph.D. student Randi Tucker’s doctoral dissertation project, “Spatial language and cognition in Diidxa za (Isthmus Zapotec)”. It will document two aspects of the representation of space in Zapotec-speaking communities of the Isthmus of Tehuantepec in Oaxaca, Mexico: lexical resources for the description of geographic entities such as land and water forms and linguistic and cognitive practices of reference to geographic-scale and small-scale space. Diidxa za, known in the literature as Isthmus Zapotec, is spoken in and around the city of Juchitán de Zaragoza. It belongs to the Zapotec language complex of the Otomanguean stock of Mesoamerican languages. Documentation of the ethnophysiographic domain of the lexicon of this language has received almost no attention, despite the diversity of landscape in the local environment. Ethnophysiography is the ethnoscientific study of the linguistic and conceptual representation of land and water forms (primarily as kinds and only secondarily as individuals labeled by toponyms). Project member Pérez Báez, who has been studying Diidxa za for ten years, has been working on a lexical database of the language (Pérez Báez et al. in preparation) with the goal of publishing it as a dictionary. Pérez Báez and collaborators are planning to explore various domains of Diidxa za ethnosemantics for this project, including notably ethnobiology, the cultural representation of living things. The proposed activity will contribute a record of the linguistic and conceptual representation of the landscape to this larger project. It will involve the elicitation of lexical items, geographic-scale route descriptions, and referential interactions about small-scale space, as well as the documentation of important landscape entities in photographs to be used as illustrations in a community dictionary. The products of this research, including an ethnophysiographic dictionary, will contribute to revitalization efforts that are already underway. The project may also provide insight into the cultural history and migrations of Diidxa za speakers. Given the endangered status of the language, due mostly to the encroachment of Spanish, the window of opportunity for documenting this specialized domain may be limited.

In addition, the Diidxa za communities offer a unique opportunity to probe the question of the role topography plays as a potential factor influencing strategies of spatial reference. Of special interest for present purposes are reference frames that are ‘anchored’ to the environment. Reference frames are coordinate systems used to ‘project’ (Piaget & Inhålder 1956) a place function (typically a spatial region) from a reference entity or ‘ground’. The anchor of a reference frame is an entity or feature that serves as the model for the axes of the coordinate system. In egocentric frames, the anchor is the body of an observer; in object-centered intrinsic frames, it is the environment – e.g., the chair in ‘The ball is under the chair’; and in geocentric frames, the anchor is some environmental feature or entity. When it comes to geocentric frames, mountain dwellers are more likely than coastal people to use mountain-based reference frames such as 'uphill'/downhill' systems, whereas coastal people are more likely to make use of 'landward'/seaward' and wind-direction-based systems. A more interesting hypothesis was advanced by Li & Gleitman 2002 in response to the finding that preferences for using particular kinds of reference frames not only vary profoundly across the languages of the world, but that the linguistic practices of a given speech community also predict the strategies its members use in recall memory (Levinson 1996, 2003; Pederson et al. 1998; Majid et al. 2004; inter alia). Whereas Levinson and Pederson and colleagues argue for language as playing an instrumental
role in the transmission and diffusion of culture-specific cognitive styles, Li & Gleitman argue that literacy, education, population geography, and topography are the only true determinants of population biases in the use of spatial frames of reference. As for topography, they specifically suggest that only small, homogenous communities in areas with highly salient geographic features will adopt these as bases for reference frames used pervasively even in small-scale space. The Diidxa za communities offer an important test case for this hypothesis because of the homogeneity of their linguistic variety distributed across a topographically diverse set of communities. There is in addition also significant variation along the other variables Li & Gleitman suggest: education level, literacy, and community size (ranging from almost 71,000 in Juchitán, a unique size within the Mesoamerican area for settlements in which indigenous languages dominate, to 4000 in La Ventosa (INEGI 2010)).

Building upon the previously collected data and existing analyses (§4), Tucker will explore the influences of topography and demographic factors on spatial language and cognition. In order to do this, she will collect in different communities around Juchitán (i) elicited data for ethnophysigographic sketches to explore the existence and salience of landmarks for each community; (ii) route descriptions to explore the use of landscape entities as anchors of reference frames in discourse in geographic-scale space, in particular, conditions of salience and uniqueness under which such entities are used; (iii) linguistic and recall data on frame of reference preferences in small-scale space, along with participants’ demographic data. Through the proposed project, Tucker will be advancing her career as a linguist specializing in spatial language and cognition, building upon her work on the influences on spatial frame of reference preferences in MesoSpace (§4).

2. The Zapotec language and its speakers
2.1 The Zapotec people and the Isthmus of Tehuantepec. Diidxa za is spoken in and around the municipality of Juchitán de Zaragoza near the southeastern coast of Oaxaca, Mexico. The sociolinguistic status of Diidxa za has not been assessed; INALI (2008) estimates the population of speakers to be around 100,000, though with 87% bilingualism. Language shift is observable in many communities such as La Ventosa and Espinal, where children are no longer learning the language. Due to this general shift to Spanish, the language is endangered. INEGI (2010) census data show that, in the population over the age of 5 in La Ventosa and Espinal, respectively 68% and 42% are speakers of an indigenous language, and 95% and 99% are bilingual in Spanish.

To date, data has been collected by Pérez Báez and Tucker in the town of La Ventosa, located about 15 km northeast of Juchitán, inland from the Laguna Superior and the Pacific Ocean. The land in the La Ventosa populated area is flat, with no elevations, and strong winds blowing North to South. In addition to La Ventosa, the proposed project will collect data from Diidxa za speakers in Juchitán and Santa María Xadani. Santa María Xadani is located 10 km to the south of Juchitán, a few kilometers from the sea and at the base of a prominent mountain. The Zapotec name of the town, Xadani, (zha’=danį*, buttocks-hill) is translated as ‘at the bottom of the hill’. The proposed study will explore to what extent this geographic feature is exploited as an anchor of spatial reference frames. Xadani is also particularly interesting for an evaluation of Li & Gleitman’s hypothesis for another reason: it shows a stronger resistance of Diidxa za against the influence of Spanish compared to other towns, as most children begin school as monolingual Diidxa za speakers. INEGI (2010) census data show that almost 98% of the population over age 5 speaks an indigenous language and only 76% are bilingual.
Additional exploration and data collection will take place in the following four towns: Unión Hidalgo, Asunción Ixtaltepec, Espinal and San Blas Atempa. These communities are located in significantly different topographic environments. **Unión Hidalgo**, located 21 km east of Juchitán, like Xadani is near the Laguna Superior. **Asunción Ixtaltepec**, located 10 km north of Juchitán, is in a mostly flat area with the Los Perros river flowing through it. Just south is **Espinal**, which has no salient landmark feature. **San Blas Atempa**, located about 26 km southwest of Juchitán in Tehuantepec, sits at the base of a small mountain on the Tehuantepec River.

2.2 The Zapotec language complex and Diidxa za. Diidxa za is one of many language varieties belonging to the Zapotecan branch of the Otomanguean stock of Mesoamerican languages. The Zapotec varieties that have been studied have VSO word order, head-marking, and phonemic tone. Work on dialectal variation and classification within the Zapotec language complex is ongoing. Observations of dialectal variation date to Fray Juan de Córdova’s *Arte en lengva zapoteca* (Cordova, [1578] 1987). Since then a number of proposals have been made for the classification of Zapotec languages (Smith-Stark 2003; Pérez Báez in press). Flatter classifications come from the Summer Institute of Linguistics (with Zapotec as a macrolanguage that includes 57 member languages (Lewis, 2009)) and Mexico’s Instituto Nacional de Lenguas Indígenas (INALI), which identifies 62 language variants in the Zapotec language group.

Data collected by Pérez Báez and Tucker in the context of the MesoSpace project (§4) show that in small-scale space, La Ventosa speakers use cardinal direction terms. Prevailing winds have consistent North-South directions and high salience in the town. However, the use of reference frames in communities with different topographic characteristics may differ. For example, in Xadani the prominent hill within the town is used as a landmark in direction-giving, and so may potentially be used in small-scale space as well. In addition, the cultural and topological relevance of the sea could make it an anchor for frame use. Such an environment is ideal for exploring the role of topography in reference frame use. To the extent that the local environment provides cues that could be used as anchors for small-scale reference frames, under what conditions are they in fact used as such by members of the community? The variables of interest here are conventionalization and the overall ecology of strategies, that is, how speakers choose a given option from the set of options that are available to them.

2.3 Previous research. Though there is much linguistic literature on Diidxa za and other varieties of Zapotec, research on spatial language remains minimal. MacLaury (1989) presents an account of the Ayoquesco Zapotec meronymy system. For Diidxa za, Pérez Báez similarly describes the system of body part terms as used in locative descriptions, to be published in a volume on spatial language in Zapotec languages (Pérez Báez in press; Lillehaugen & Sonnenschein in press). Lillehaugen’s 2006 dissertation describes in detail aspects of the spatial language in Tlacolula Valley Zapotec, specifically body part terms and their categorical status. Pérez Báez (2011) is the first in-depth study of spatial language in Diidxa za, based on work resulting in part from the MesoSpace project (§4).

In the area of lexicography, analysis of data collected as part of the Project for the Documentation of the Languages of Mesoamerica (PDLMA) is underway, including Pérez Báez et al. (in preparation). As mentioned in §1, a lexical database is in preparation based on work carried out primarily by Pérez Báez within the context of PDLMA.
The proposed project will expand upon this previous research, exploring the domain of ethnophysiography and its interaction with spatial reference frames. O’Meara & Pérez Báez (2011) present MesoSpace findings concerning the use of frames in other languages of Mesoamerica. Especially relevant to the question of the influence of topography is Polian & Bohnemeyer (2011), who discuss the variation in use of topography in geocentric frames in different communities of Tseltal speakers.

3. Ethnophysiography

Ethnophysiography is the study of the linguistic and cognitive representation of the landscape domain in ‘emic’, language- and culture-specific terms. It is an ethnoscience of landforms, bodies of water, and natural assemblages of vegetation (Mark & Turk 2003). Alternative terms include ‘ethnobiogeography’ (Hunn & Meilleur 1998), ‘geographical ontology’ (Burenhult 2004), and ‘ethnoecology’ (Johnson & Hunn 2010). Ethnophysiography extends the classic research of the cognitive anthropologists on the linguistic categorization of the natural world in domains such as color (e.g., Berlin & Kay 1969), kinship (e.g., Lounsbury 1964), and plants (Berlin, Breedlove, & Raven 1974) to the domain of geographic entities and features. Contributions to this nascent field include Mark, Smith & Tversky (1999), Bohnemeyer (2002), Smith & Mark (2003), Burenhult (2004), the articles in Burenhult & Levinson (2008), and O’Meara (2010).

By documenting the landscape terminology of Diidxa za and its usage in direction-giving and other discourse, the proposed project will build upon and contribute to the existing ethnophysiographic research. The project will focus on ethnophysiography as the linguistic and conceptual representation of geographic features as kinds rather than as individuals labeled by toponyms. This research will contribute to our understanding of cross-linguistic variation in this domain, as well as to the ethnography of Diidxa za.

4. The MesoSpace Project

Diidxa za has been selected for the proposed project based on Tucker’s analysis of data she collected under the guidance of Pérez Báez as part of the NSF-funded projects “Spatial language and cognition in Mesoamerica” (BCS-0723694; “MesoSpace I” for short) and “Spatial language and cognition beyond Mesoamerica” (BCS-1053123; “MesoSpace Ib”). The MesoSpace Project is investigating the representation of spatial information in 27 languages worldwide (16 of them indigenous languages of Mexico, Guatemala, and Nicaragua). The first phase of the project focuses on two unusual traits of spatial reference in Mesoamerican languages: i) the widespread absence or paucity of use of relative frames of reference and ii) the highly productive use of shape-based ‘meronyms’, i.e., terms that describe entities as parts of larger entities.

Data on Diidxa za has been collected by Pérez Báez using the MesoSpace tasks Ball & Chair (a photo-matching referential communication task) and New Animals (a non-linguistic recall memory task (§5.4)), and later by Pérez Báez and Tucker using the referential communication task Talking Animals (§5.3). Analyses of these data show that there is a strong and consistent preference for use of the absolute spatial frame of reference both in recall and linguistic tasks in the Zapotec speakers of La Ventosa (Pérez Báez 2011). Further, there may be some variation based on individuals’ levels of education and bilingualism. For example, some speakers from a different neighborhood than the MesoSpace I participants, with little to no education, favored direct and landmark-based frames, which are virtually unused among speakers with elementary to high school education. Also, the use of three-dimensional figures (versus two-dimensional
5. **The proposed activity**
The proposed project involves field research in which Tucker will collect linguistic and recall memory data and explore the expressions used in describing spatial configurations in communities around Juchitán. The methods to be employed include lexical-semantic and ethnographic elicitation of landscape terms with individual speakers; interactive elicitation of route descriptions with dyads of speakers; a referential communication task focusing on reference frames, which will likewise involve dyads of speakers; and a recall experiment. In addition, demographic data crucial to the quantitative analysis of the linguistic and recall memory data will be collected.

5.1 Ethnophysiographic elicitation. Tucker will search existing dictionaries and lexical databases (Pérez Báez et al. in preparation) for labels for kinds of land and water forms. She will verify the results with speakers from the various Diidxa za communities and then use the already identified terms to prompt speakers for additional terms of the same semantic subfield. For example, known labels for bodies of water can be used to establish the domain of bodies of water as a topic, to then ask whether the speakers know of additional terms in this domain. Furthermore, speakers will be asked to identify instances of the category named by each term in their local environment, along with any cultural information they may have about the entities or features in question (e.g., stories and historical events in which these play a role, economic/political/cultural significance). This procedure will produce rich input for the ethnophysiographic thumbnail sketches and also for the procedure described in 5.2. The elicitation sessions will be video- and audio-recorded. The procedure will be carried out with five speakers each in Juchitán, La Ventosa, Xadani, and additional communities (5.6).

5.2 Elicitation of route descriptions. Tucker will elicit route descriptions from five dyads of speakers per community, using a selection of the landscape entities elicited in 5.1. Dyads are used because speakers are more likely to rely on local landscape features among one another than when talking to a stranger who does not know the area. The elicitation will be framed as a game. A trial involves one speaker being given a particular landscape feature selected from the results of the task described in 5.1, ideally identified by a toponym. The goal of the game is to have the fellow speaker guess this landscape entity without actually naming it. The only information the first player is allowed to reveal is a route description leading to the land or water form in question. This procedure will determine which of the terms produced by 5.1 - if any - are used in reference to anchors (cf. §1) of geocentric frames in the community and to what extent this use is conventional among members of the community. Conventionality can be assessed in terms of recurrence of the use of a particular anchor across speakers. The elicitation sessions will be audio- and video-recorded. The task will be carried out in Juchitán, La Ventosa, Xadani, and additional communities (5.6).

5.3 Spatial frames of reference in small-scale space. The Talking Animals task elicits the use of spatial reference frames in discourse via descriptions of stimuli in table-top space. This referential communication task requires participants to describe configurations of toy animals so that a fellow participant can arrange their own set of animals to match. A screen positioned
between the two participants prevents visual attention sharing and thus forces the participants to use referentially maximally explicit descriptions instead of relying on deixis and gesture. Once the ‘matcher’ has finished, the ‘director’ checks their configuration and provides additional instructions if necessary. Thus, the director produces propositions that orient the figures and locate them with respect to the other figures. The task is video- and audio-recorded, and the descriptions that are produced are transcribed, coded, and analyzed for reference frame use. This task will be run with up to 20 pairs of speakers per town for a total of about 30 recorded hours. Transcription and coding for the task is expected to take less than 50 hours total per town. To be carried out in Juchitán, La Ventosa, Xadani, plus potentially in additional communities (5.6).

Unlike the Men & Tree (Danziger 1992) or Ball & Chair (Pérez Báez 2008) task, Talking Animals makes use of three-dimensional objects so as not to suppress geocentric frames. Talking Animals also requires less time for each dyad to complete, allowing for more data to be collected from more participants in a shorter amount of time. The large number of participants planned for Talking Animals allows for assessment of inter-speaker variation. The amount of data is also necessary to achieve the statistical power required to simultaneously analyze the large number of combined variables. The Talking Animals task has already been used for data collection in La Ventosa; the recordings have been transcribed, and coding and analysis are underway.

5.4 Recall memory experiment. The New Animals task explores reference frame use in recall memory. Such data will contribute to the debate over the influence of language on cognition (§1). Participants view a linear configuration of toy animals, turn 180 degrees to another table, and then recreate the configuration from memory. The order and facing direction of the placed animals reveals the frames used to mentally encode the original configuration. The task will be run with at least 16 participants per community and results are recorded on a paper coding sheet. No further coding or transcription is necessary. To be carried out in Juchitán, La Ventosa, Xadani, plus potentially in additional communities (5.6).

5.5 Demographic questionnaire. The participants in the tasks described in 5.3-5.4 will fill out with Tucker’s help a questionnaire designed to record their levels of literacy and education and the frequency with which they use Spanish as a second language. These are predictor variables that enter the quantitative analysis of the frequency data on reference frame use (5.8).

5.6 Additional communities. In the other communities discussed in §2.1 an abridged version of 5.1 and 5.2 will be carried out to further explore the inventory of ethnophysiographic terms and their usage in direction-giving. If data are discovered that give reason to explore frame use in small-scale space (i.e. differences from Juchitán, La Ventosa, or Xadani), 5.3-5.5 may be run here too.

5.7 Transcription and coding. The linguistic data collected in 5.1 will be transcribed and translated into Spanish with the help of speaker-consultants. The linguistic data collected in 5.2 and 5.3 will be transcribed and translated with the help of a local collaborator from La Ventosa, with whom Tucker worked during her 2012 trip. This assistant is highly experienced in using ELAN to transcribe and translate data produced by the Talking Animals task and other data. The Talking Animals data will be coded by Tucker under the supervision of Pérez Báez.
5.8 Statistical analysis. A multivariate statistical analysis of the Talking Animals data, similar to that developed by the MesoSpace team, will be used to infer the influence of various factors. This approach departs from previous applications of multivariate statistics in semantic typology (e.g., Levinson & Meira 2003; Majid et al. 2008) in that it treats the behavior of individual participants as the principal response variable (or describes it in terms of a set of response variables, e.g., in the case of the MesoSpace analysis, one for each major reference frame type, recording the frequency with which that frame type was used by each participant), and language as one of the predictor variables, along with the regularity of use of Spanish as a second language and Li & Gleitman’s proposed explanatory variables of literacy, education level, and the combination of topography and population geography. Bohnemeyer et al. (2012) pilot a phylogenetic analysis of a data matrix along the lines described above, encoding frame frequency, language group, use of Spanish, and level of literacy and education for speakers of six Mesoamerican languages, two non-Mesoamerican indigenous languages, and three varieties of Spanish, using the Neighbor-net algorithm (Huson & Bryant, 2006). Currently the team is working on a mixed-effects linear regression analysis of the same data matrix. Preliminary results suggest a significant effect of language that cannot be reduced to a combination of the other variables. An application of this approach to the analysis of reference frame use among speakers in different Diidxa za communities would replace the global language variable with one or more phonetic, lexical, or morphological variables known to be sensitive to local variation in the Isthmus region. Along with the frequencies of use of the various frame types, the data for assessing each participant in terms of these linguistic variables will be extracted from the Talking Animals recordings. Current planning is informed by the hypothesis that the realization of certain tonal morphemes may be a suitable cue. The analysis would pit such variables that capture fine-grained dialect variation against topography, settlement size, and participant demographics to see how they fare as predictors of reference frame use and to specifically test Li & Gleitman’s prediction that topography is a more powerful factor the smaller and the more close-knit the linguistic community is.

5.9 Ethnophysiographic dictionary. Using the data collected in 5.1-5.3, Tucker will produce a dictionary of geographic or landscape terms, with definitions and photographs, for possible use by the community in language preservation and revitalization. Photographs will be taken with the help of community guides. The material produced for this dictionary may also be incorporated into the lexical database that is currently underway by Pérez Báez and PDLMA.

5.10 Archiving and dissemination of data. Digital audio recordings will be made with a solid-state recorder. The video will be recorded on digital memory disk and backed up on two external hard drives in the field. Audio from both devices will also be transcribed and translated in the field. The audio and video data and the corresponding transcripts will be housed at the Archive for the Indigenous Languages of Latin America (AILLA), University of Texas, Austin. Dr. Susan Smythe-Kung, the manager of AILLA, will be consulted regarding the preparation of archival quality data. AILLA will make the data collected during the proposed activity accessible online, including to the Diidxa za community. The AILLA website is available in English and Spanish, and the internet is accessible to Diidxa za community members in most towns through internet cafes.

Tucker will also consult with the Lidxi Gendabiaani (Casa de la Cultura) in planning to archive at their emerging Centro Cultural y Académico in Juchitán. The archive is still in
development, but they seek materials for use by community members and scholars. Tucker will consult with them to find the most appropriate way to capitalize on the products of the proposed project. Early in the project, Tucker will consult with the Casa de la Cultura to understand how the products of this research can be collected and processed to be of use to them. Tucker and Pérez Báez have met with the leaders of the Casa de la Cultura, and Pérez Báez is currently working with them on a pictorial dictionary project.

6. Research Schedule
Tucker’s initial field trip to La Ventosa was in April 2012. During this trip she met with cultural leaders based in Juchitán at the Casa de la Cultura and established relationships with Diidxa za researchers in La Ventosa, Xadani, and Juchitán. The analysis of the data that was collected is underway. The field trips of the proposed project will occur in the early summer of 2013 and late spring of 2014, during which Tucker will spend a total of 12 weeks performing elicitation and recording data. The data will be transcribed with the help of a Diidxa za speaker from La Ventosa, with whom Tucker worked during her 2012 trip. This assistant is highly experienced in using ELAN to transcribe and translate data produced by the Talking Animals task and other data. Initial analysis of some of the data will be performed in the field in order to inform later elicitation sessions. The remainder of the analysis will be performed during the academic year following each trip and will be incorporated into a dissertation shortly thereafter. In the interim, data will be compared with data collected from other Zapotec and Mesoamerican languages, and some presentations of work in progress will be given.

6.1 September 2012 – May 2013 (unfunded). Tucker will work with Pérez Báez on coding and analysis of the Talking Animals data that they collected in April 2012. Tucker will search existing dictionaries and lexical databases for labels for land and water form types, in preparation for ethnophysiographic elicitation.

6.2 June – July 2013. All field equipment will be acquired using NSF funds. Tucker will conduct the first field trip to La Ventosa, Xadani, and Juchitán (§2.1). Beginning in La Ventosa, Tucker will carry out the studies outlined in sections 5.1-5.2 (the tasks in 5.3-5.5 have already been carried out in that community). At the same time, Tucker will lay the groundwork in the field sites of Juchitán and Xadani, carrying out at least the tasks of 5.1-5.2, and as much of 5.3-5.5 as possible. NSF funds will be used for travel, field subsistence, consultant and transcription fees.

6.3 August 2013 – February 2014. This period will be dedicated to processing the data collected during the first field trip, both in view of the procedures described in 5.7 and in terms of further linguistic analysis. The statistical analysis (5.8) will be further developed, and collected data (5.1-5.2) will be added to lexical databases. At the same time, the second field trip will be prepared.

6.4 March – May 2014. Tucker will conduct the second field trip, completing data collection (5.3-5.5) if necessary, and collecting photographs (5.9). During this trip, additional communities will be visited (5.6) and the studies sketched in sections 5.1-5.6 will be completed. Further processing of the data (5.7), to the extent that this needs to be done in the field, will be carried
out as well. NSF funds will be used for travel, field subsistence, consultant and transcription fees.

6.5 June 2014 – May 2015. The final phase of the project will see the completion of the data processing and archiving procedures (5.10). The ethnophysiographic dictionary (5.9) will be completed and presented to the community. The statistical analyses will be performed and publications of findings will be prepared. This includes in particular the creation of any products desired by the Juchitán cultural leaders for the Diidxa za community and the preparation of scholarly publications associated with this project.

7. Feasibility
The PI has studied indigenous languages of Mexico since 1989, including a total of more than two years of field work on Yucatec Maya. His research specialties are semantics and linguistic anthropology. He also teaches field methods. He has published numerous articles and book chapters on spatial semantics and ethnophysiography in Yucatec and crosslinguistically. The PI was a founding member of the research project on landscape terminology at the Max Planck Institute for Psycholinguistics. He has also been the PI of the NSF funded MesoSpace Project (§1) and continues to publish at the forefront of semantic typological research.

Co-PI Mark is a geographer trained in geomorphology who shifted his research emphasis to geographic information science in the early 1980s; recently he has specialized in geographic cognition and the ontology of the geographic domain. He has conducted many studies with human subjects over the last decade, mostly about the semantics of locative expressions and the meanings of basic landscape terms. Mark conducted ethnographic fieldwork on the meanings of landscape terms in Yindjibarndi in northwestern Australia (2002 and 2003), and with Diné (Navajo) people in New Mexico in 2005. He was a visiting researcher at the Max Planck Institute for Psycholinguistics in Nijmegen for a month in 2002.

Co-PI Tucker conducted initial fieldwork on Zapotec spatial frames of reference in La Ventosa for two weeks during the summer of 2012, under the guidance and supervision of Pérez Báez. During that time period, Tucker made further contacts within the community and began developing working relationships with a few native speaker consultants. Linguistic and recall data were collected using the MesoSpace tasks Ball & Chair (§4), Talking Animals (§5.3), and New Animals (§5.4). Tucker also worked with native speaker transcriptionists to improve her knowledge of the language. The feasibility of this project is strongly supported by Tucker’s experience with collaborative projects, her professional relationships with Zapotecanists and other researchers of Mesoamerican languages, and her knowledge of the literature on spatial language and cognition. Tucker also has extensive experience managing large-scale collaborations from her years as a research assistant for the MesoSpace Project.

Dr. Gabriela Pérez Báez has been conducting field research on Zapotec since 2002 and is Assistant Curator for Linguistics in the Department of Anthropology at the Museum of Natural History of the Smithsonian Institution, as well as a MesoSpace project member. She has published extensively on spatial language in Diidxa za. She has worked independently, at the Smithsonian, and in the Project for the Documentation of the Languages of Mesoamerica (PDLMA), on documentation and revitalization. She is currently writing a dictionary of Diidxa za and is directing the Smithsonian project “Comparative Study of Tone Phenomena in Zapotec Languages”.
In addition to the above personnel, the project will be benefiting from the expertise of Dr. Carolyn O'Meara (Universidad Nacional Autónoma de México) in the role of an external collaborator. O'Meara has worked extensively on the ethnophysiography and spatial grammar of Seri, another indigenous language of Mexico.

8. **Intellectual Merit**

A description of the spatial language of Diidxa za promises to provide significant contributions to linguistics. A good deal of research has been performed in one community of speakers of this language (Pérez Báez 2008, 2011, *inter alia*), but not in other communities in drastically different topological environments. The description of the lexicalization of topographic features and their cultural salience will contribute to the fields of ethnophysiography, anthropology, and related fields.

This project will moreover explore the role of topography in spatial frame of reference preferences in language and cognition. This topic speaks to the Linguistic Relativity Hypothesis, which posits that language has a causal influence on cognition. The proposed activity will directly test the role of linguistic and extra-linguistic factors – especially, but not restricted to, topography – in driving population-specific biases in referential practice. The environment of Juchitán – a large and homogenous speaker base distributed across discrete towns with differing topography – provides an ideal context for testing the competing hypotheses in this debate. This research will ultimately contribute to the current general discourse on the relationships between language, culture, and thought, as the exploration of spatial language has already proven to be a key window into cognition.

9. **Broader Impact**

Diidxa za is an endangered variety that is losing ground to the dominant language of Spanish, such that the language may not be spoken in some of these communities in as little as 30 years from now. The collection and dissemination of detailed data on the semantic domain of landscape terms will aid revitalization efforts. Copies of the ethnophysiographic dictionary will be provided to the community. Recorded data and findings will be made accessible to the local speaker communities as well as the linguistic academic community. The project will provide the research community with a better sense of the sociodemographic composition of the Juchiteco speaker base, and will allow for the identification of individuals in communities outside of Juchitán who could join in the emerging revitalization efforts for the region. The project will strengthen existing collaborations and create new collaborations among linguistic researchers from the United States and Mexico. This work will also strengthen the relationships between linguistic researchers and the local Zapotec communities. Tucker will work with the community members with whom Pérez Báez has worked, and thus will provide an opportunity to continue engaging them in a more sustained manner. In addition, the study will advance the scientific training and academic career of a female doctoral student in linguistics.