A Semantic Study on Yami Ontology in Traditional Songs

Yin-Sheng Tai
Providence University,
Taiwan
wratp2@msn.com

D. Victoria Rau
Providence University,
Taiwan
dhrau@pu.edu.tw

Meng-Chien Yang
Providence University,
Taiwan
mcyang2@pu.edu.tw

Abstract

The purpose of this study was to provide an example of how to build a Yami ontology from traditional songs by employing Protégé, an open-source tool for editing and managing ontologies developed by Stanford University. Following Conceptual Blending Theory (Fauconnier and Turner, 1998), we found that Yami people use the conceptual metaphor of "fishing" in traditional songs when praising the host's diligence in a ceremony celebrating the completion of a workhouse. The process of building ontologies is explored and illustrated. The proposed construction of an ontology for Yami traditional songs can serve as a fundamental template, using the corpus available online from the Yami documentation website (http://yamiproject.cs.pu.edu.tw/yami) to build ontologies for other domains.

1 Introduction

Yami is an endangered Austronesian language, spoken on Orchid Island (Lanyu), 46 kilometers southeast of the main island of Taiwan. For the purposes of language documentation and preservation, an on-line Yami dictionary[1] has been developed to facilitate language learning. Although each lexical entry contains basic meanings of words (in both English and Chinese), pronunciations, and roots and affixes, no information on lexical semantics, such as synonyms, hyponyms, or metaphors is available. If information on lexical relationships could be incorporated into the Yami dictionary, this online tool would be even more useful for Yami language learners.

In the present study, we focused on the metaphors in Yami lyrics. Knight (2005) considers that, from a Yami native speaker's point of view, "Raods" (traditional songs) play an important role in culture because they subsume features such as archaism, metaphors, puns and polite contradiction. In addition, Yami traditonal songs reflect Yami values, such as love and honoring hard work (e.g. fishing or farm work), and cultural events, such as completion of hard work and special festivals. Thus, we would like to build an ontology using Yami traditional songs, adapting the taxonomies in WordNet and SUMO, which can serve as a point of departure for further mapping of other Yami ontologies. In this paper, we will report our preliminary results, giving one example at this early stage of the research project on constructing Yami ontology, led by the second and third authors.

2 Literature Review

2.1 Conceptual Metaphor Theory

The original Conceptual Metaphor Theory was proposed by Lakoff and Johnson (1980). They identify metaphor as a transfer between the source domain and the target domain. This has become known as the "two-domain theory" of metaphor.

2.2 Conceptual Blending Theory

Conceptual Blending Theory (Fauconnier and Turner, 1998; 2002) is a framework for interpreting cognitive linguistic phenomena such as analogy, metaphor, etc. According to Conceptual Blending Theory, the input structures, generic structures, and blend structures in the network are *mental spaces*. In Figure 1, the frame structure recruited to the mental space is represented as a rectangle either outside or iconically inside the circle.

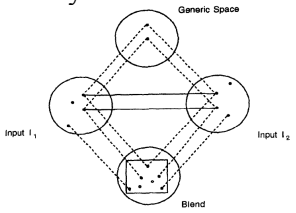

Figure 1. Conceptual Blending Theory

[1] Available from the following IP address: http://yamiproject.cs.pu.edu.tw/elearn/search.php

2.3 Protégé

In this study, we are building a Yami ontology based on traditional songs using Protégé[2], which not only provides a rich set of basic knowledge-modeling structures and a way to enter data, but can also be customized to create new domains in knowledge models.

As demonstrated in previous studies (e.g., Dodds, 2005; Lin 2006), Protégé has been successfully applied to construction of ontology in specific domains. Therefore, the present study used Protégé to construct an ontology of Yami traditional songs.

3. Methodology

3.1 Data Collection

The main data resource came from Dong's monograph (1994) *"In Praise of Taro,"* which contains a total of 250 songs. This study is based on one song which contains many fishing metaphors. Seven metaphorical tokens were extracted from this song.

3.2 Data Analysis

First of all, the question of the use of metaphor in Yami was analyzed by Lakoff & Johnson's Conceptual Metaphor Theory (1980) and Fauconnier and Turner's Conceptual Blending Theory (1998). Secondly, two taxonomic tenors were identified using *WordNet* (Fellbaum, 1999) and *Yami Texts with Reference Grammar and Dictionary* (Rau & Dong, 2006). Based on these taxonomic tenors, Yami words were classified into "Verbs" and "Nouns".

4. Results and Discussion

4.1 Conceptual Blending

In the following discussion, we begin with an analysis of a traditional Yami song celebrating the completion of a workhouse with a harvest of taro. It mostly praises the host's achivement and hard work. After praising the host's achivement, the guests take all the host's taros and cover the roof of the workhouse with them. Finally, the guests sing songs with the host in turn.

The lyric is illustrated as follows:

1 oya rana **minangyid** siapen rarakeh
this already reached_the_harbor grandfather old
"Now, the old man reached the harbor."

2 ji na minatokod **Jicamongan** ta
NEG already reached PLN because
"He didn't paddle to Jicamongan."

3 **kalagarawan** am **panenenеban** o ...
fingerling_place TOP shallow_sea NOM ...
"He moved in the shallow sea where only fingerling fish live."

4 to na rana **avavangi** sia ta
AUX 3.S.GEN already row a boat there because
"He could only row his boat there"

5 ji na rana **voaz** o **kakaod**
NEG 3.S.GEN already row NOM paddle
"Because he had already lost strength to row."

Seven metaphorical tokens related to "fishing" were detected from the lyric. They are marked in bold case. In Line 1, *minangyid* "reached the harbor" was identified as metaphorical because although it literally describes going back home after finishing one's fishing, its intended meaning is "to rest and hold a ceremony celebrating the completion of a workhouse." Using the Conceptual Metaphor Theory (1980), we compared the cognitive activities in the lyrics and the mental space (Table 1). The entities, quality, and functions in the domain of fishing were analyzed.

Table 1. Reached the harbor vs. Holding a ceremony celebrating the completion of a workhouse

	reached the harbor (V.)		to hold a ceremony celebrating the completion of a workhouse
Agents	fisherman	→	host (also the "builder") of the ceremony
Patients	boat	→	new workhouse
Attachments	fish	→	taro
Locations	harbor	→	yard
Purposes	to share his achievements and honor with his friends and relatives	→	to share his achievements and honor with his friends and relatives

Table 1 shows that Yami people prefer to use "fishing" as a metaphor for the intended meanings of building a house or farming. We further employed the Conceptual Blending Theory (1998) to interpret the "harbor" example (see Figure 2).

[2] Protégé is a free, open source ontology editor and knowledge-base framework. The IP address of Protégé is: http://protege.stanford.edu/.

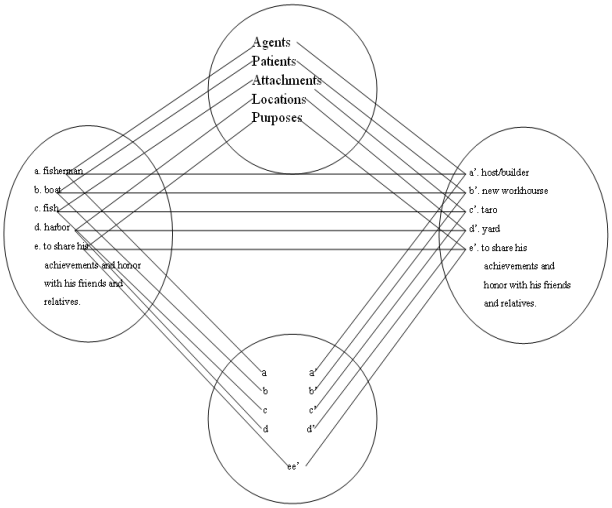

Figure 2. "Reached the harbor" vs. "Holding a ceremony celebrating the completion of a workhouse"

The concept of "reached the harbor" is categorized into Input space I, and "holding a ceremony celebrating the completion of a workhouse" is categorized into Input space II. Both Inputs have certain similarities as well as distinct features. From Input Space I, "fisherman," "boat," "fish," "harbor," and "to share his achievements and honor with his friends and relatives" are respectively mapped into "host/builder," "new workhouse," "taro," "yard," and "to share his achievements and honor with his friends and relatives," in Input Space II. The Inputs might share some cross-mapping properties, which can be listed in the Generic space. The structure from the two input mental spaces is projected into the Blend space. Essentially, which elements from Input space II should be selected and projected onto the blend space are determined by the contents of the lyric. Thus, in the blend space, all elements remain separate from their corresponding counterparts, but the relations among the features in Input space I determines the relations between corresponding counterparts. That is to say, the running structure in the blend space partially projected from Input space I determines the existing relations among the elements in the blend. In Input space I, a "fisherman" needs a "boat" to fish in the ocean, so the relation between "fisherman" and "boat" is a kind of "earning a living." In addition, what a "fisherman" works for is "fish." After the fisherman finishes his work, he has to go back to the harbor. Such relations also operate among those elements projected from Input space II. As a result, "the host of the completion ceremony of a workhouse" is the "fisherman" of the "workhouse ceremony;" the relation between "the host" and the "workhouse ceremony" is that of "finishing a time-consuming job." Additionally, "taros" in the yard are compared with "fish" at the harbor, which await to be "shared with friends and relatives."

4.2 Taxonomy

Yami verbs subsume dynamic verbs and stative verbs (Rau and Dong, 2006). Based on the notions from *WordNet*, we further divided verbs into Bodily Function and Care Verbs, Change Verbs, Communication Verbs, Competition Verbs, Consumption Verbs, Contact Verbs, Cognition Verbs, Creation Verbs, Motion Verbs, Emotion or Psych Verbs, Stative Verbs, Perception Verbs, Possession Verbs, Social Interaction Verbs, and Weather Verbs. Since Yami does not possess a distinctive adjective word class, both descriptive and relational adjectives are in this study classified under stative verbs in *WordNet*. Descriptive adjectives subsume antonymy, gradation, markedness, polysemy and selectional preferences, reference-modifying adjectives, color adjectives, quantifiers, and participial adjectives. Relational adjectives include two domains, "pertaining" or "relating to" (Fellbaum 1999: 63). The coding of adjectives in this file is different from that of descriptive adjectives. Rather than being part of a cluster, each synset is entered individually, so that the interface will present the adjective with its related noun and information about the sense of the noun.

For the aspect of Yami Nouns, we categorized the nouns into 10 basic noun categories following *WordNet* (Fellbaum, 1999: 30), including entity, abstraction, psycho-feature, natural phenomena, activity, event, group, location, possession, and state.

4.3 Example from the Yami Lyric

The following example illustrates how we extracted the metaphorical words of "fishing" from the lyric and classfied them into their domains.

Firstly, *minangyid* "reached the harbor," *avavangi* "row, sail something" and *voaz* "row something," were classified as Motion Verbs. Secondly, *Jicamongan* "a place name of deep water," *kalagarawan* "a place where fingerling fish swim" and *panenenebanan* "shallow place," were categorized under the main section Location and

the sub-section Sea. Finally, *kakaod* " paddle" was classified in the main section Entity and the sub-section Artifact, as shown in Figure 3 and Figure 4.

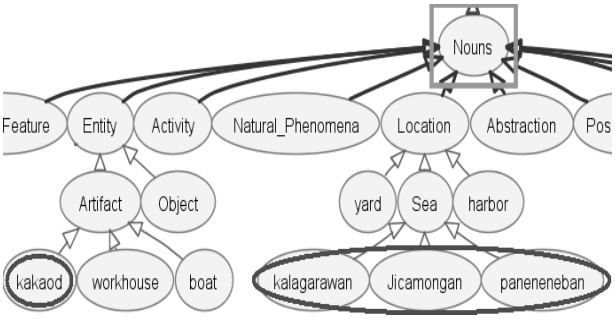

Figure 3. An example of four Yami nouns in the ontology of Yami lyrics

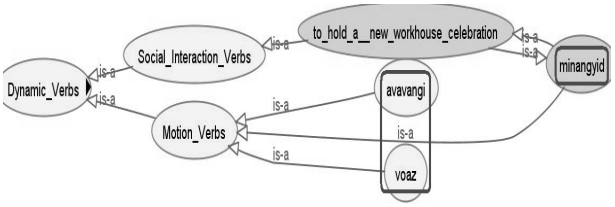

Figure 4. An example of three Yami verbs in the ontology of Yami lyrics

4.4 Mapping metaphorical words

To classify Yami metaphor, we made links (equivalent classes) between the literal meaning and the metaphorical meaning using Protégé. Since Input space I usually works as the source domain and Input space II as the target domain, we found that, at least in this case, this is a one-sided network of metaphor mapping. We thus employed the property "mappings" to define the relationship between "reached the harbor" and "to hold a new workhouse celebration." Moreover, in order to set up the restrictions for searching words, we added the property "hasConceptOf". We then named the class expression of "reached the harbor" with the following restriction:

has_concept_of some[3] (harbor and[4] fish and fisherman and boat and share)

Similarly, we also provided the phrase "to hold a new workhouse celebration" with the following restriction:

has_concept_of some (host and builder and workhouse and share and taro and yard)

Finally, for the sake of correctly linking meanings of each word, the ontology builder can check the ontology with the DL Query Tab in Protégé.

In summary, the connection between the two items *minangyid*, "reached the harbor" and "to hold a new workhouse celebration," shown in shadow in Figure 4, is solely based on the structure of the inputs, since each of them are from a different domain of verbs. This structure is in harmony with Yami custom and contextual structure.

5 Conclusion

This paper has provided an example of how to construct an ontology of Yami using traditional songs. We hope this approach will serve as a fundamental template for further mappings with more texts to produce other Yami ontologies.

References

Dodds, D. 2005. *Qualitative geospatial processing, ontology and spatial metaphor*. presented at the GML and Geo-Spatial Web Services.

Dong, M. N. 1995. *In Praise of Taro.* Dao-Xiang Publisher.

Fauconnier, G. & Turner,M. 1998. Conceptual Integration Networks. *Cognitive Science*, 22 (2), 133-187.

Fellbaum,C. 1999. *WordNet:an Electronic Lexical Database*. Cambridge,Mass.: MIT Press.

Knight, P., & Lu Y. H.. 2005. *Music heritage of the oral traditions by meykaryag of the Tao tribe*. Paper presented at the 2005 International Forum of Ethnomusicology in Taiwan: Interpretation and Evolutionof Musical Sound. Taipei: Soochow University.

Lakoff, G. & Johnson, M. 1980. *Metaphors We Live By*. Chicago: University of Chicago Press.

Lin, J.H. 2006. *Using formal concept analysis to construct the computer virus characteristics domain ontology*. MA thesis, National Yunlin University of Science & Technology, Taiwan.

Rau, D.Victoria & Dong, M. N. 2006 *Yami Texts with Reference Grammar and Vocabulary*. Language and Linguistics, Academia Sinica, Taipei, Monograph A-10.

[3] This refers to the existential quantifier (∃) in OWL syntax, which can be read as at least one, or *some*.

[4] An intersection class is described by combining two or more classes using the *AND* operator (⊓).