

# The Acquisition of Body Part Prepositions in Valley Zapotec\*

*Brook Danielle Lillehaugen*  
*University of California, Los Angeles*

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## 1. Introduction

In this paper I examine the acquisition of body part (BP) locatives in Valley Zapotec (VZ). I seek to address the following questions: does the fact that the BP locatives developed from and are homophonous with body parts affect their acquisition? Are children sensitive to the grammatical differences between the BP locatives and body part nouns?

This paper reports the results of two children acquiring San Lucas Quiavini Zapotec (SLQZ), ages 1;6 and 2;3.<sup>1</sup> Their knowledge of the meanings of both the body parts and the BP locatives was tested using a forced-choice, picture identification task. The data suggest that the BP locatives are acquired as independent grammatical elements and their acquisition is not related to the acquisition of the corresponding body parts. The results are consistent with an analysis of BP locatives as prepositions.

The use of BP terms in locative expressions is an areal feature of Meso-American languages (Kaufman 1974) and a feature of Valley Zapotec languages. As exemplified by SLQZ in (1), VZ can use the same word to refer to a body part (in a) and in a locative construction (in b).

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I use the following abbreviations: 1s, first person singular; HAB, habitual aspect; NEU, neutral aspect; PERF, perfective aspect; PL, plural marker; POSS, possessed; PROG, progressive aspect. 1 Ages are given in the following format: years;months(:days). For example, 2;3 stands for two years and three months old and 1;6;14 stands for one year, six months, and fourteen days old.

- (1) a. R-ahcnah **làa'iny**=a'.  
 HAB-hurts stomach=1s  
 'My stomach hurts.'
- b. Nàa' zu'bga'=a' **làa'iny** co'ch.  
 I NEU.sit=1s STOMACH car  
 'I am sitting in the car.'

### 1.1. The languages

I will be referring to the language group that contains SLQZ<sup>2</sup> and San Marcos Tlapazola Zapotec (SMTZ)<sup>3</sup> as Valley Zapotec. Valley Zapotec languages belong to the Oto-Manguean stock and are spoken in the Tlacolula Valley, 30 km southeast of Oaxaca City, Mexico, and by many immigrants in the greater Los Angeles area. VZ contains the languages classified by the Ethnologue (Grimes et al. 1996) as San Juan Guelavía Zapotec (code ZAB). All VZ languages should be considered endangered since they are losing speakers faster than they are gaining them.

### 1.2. Relevant Valley Zapotec syntax

VZ languages exhibit head initial typology. The most common word orders in sentences are VSO and SVO. Possessed noun phrases precede their possessor (2a), and prepositions precede their objects (2b).

- (2) a. Ní'ih me'es guèch.  
 foot table PERF.break  
 'The leg of the table broke.'
- b. Bèe'cw ca-zh:ùu'nny càà'n guèu'.  
 dog PROG-run alongside river  
 'The dog is running alongside the river.'

Body part nouns in VZ languages are obligatorily possessed. They require a possessor, which can be expressed with a bound pronominal clitic corresponding to the person and number of the possessor or with a full noun phrase (NP).

BP prepositional phrases (PPs) can be phonetically ambiguous with possessed NPs since the object of the preposition follows the preposition and the possessor of the body part follows it. For example, *ni'ih me'es* is ambiguous between the PP 'under the table' and the possessed NP 'the table's leg'.

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2 The SLQZ data in this paper come both from Munro, Lopez, et al. (1999) and from Munro's and my unpublished field notes on this language.

3 The SMTZ data in this paper comes from the work of Jensen de Lopez (1999, 2002).

### 1.3. BP locatives as prepositions

Previously, I have argued that the BP terms used in locative expressions are not syntactically nouns, though identical in form to and historically developed from the nouns for body parts (Lillehaugen 2003, to appear). Classifying these terms as prepositions in the syntax of these languages provides the simplest account of their syntactic distribution. This claim, however, is not uncontroversial. Some linguists studying Zapotec languages have assumed that BP locatives are nouns and that the locative meaning is derived through metaphorical extension. In discussing the metaphorical system employed in body part locatives, MacLaury (1989) says of Ayoquesco Zapotec:<sup>4</sup>

[the] body-part locatives are not prepositions, because there is no justification for setting them apart from their primary classification as nouns. Unlike English prepositions, they are identical in form to the nouns applied to body organs, their use in syntax is optional, they only add specificity to other locative expressions, they do not complicate syntax, they do not denote direction, and they do not mark grammatical relations as do case markers (120).

As I argue in Lillehaugen (2003), BP phrases such as *ni'ih me'es* in (3a) cannot be substituted with NPs. An argument following MacLaury's (1989) assumptions would claim that *ni'ih me'es* is a NP, 'the table's foot'. However, if this category is nominal, then this verb ought to be able to c-select other NPs which could function as locations, but as shown in (3b), this is not possible.

- (3) a. Bèe'cw zùub [ni'ih me'es].  
       dog NEU.sit FOOT table  
       'The dog is sitting under the table.'
- b. \*Bèe'cw zùub [me'es].  
       dog NEU.sit table  
       'The dog is sitting by/near/on/under the table.' *Bad with any reading.*

Although positional verbs seem to select for phrases that begin with a body part word as in (3a) and (4b), it is not the case that the phrase can begin with any body part word, as seen in (4a).

- (4) a. \*Bèe'cw zùub [dyahg me'es].  
       dog NEU.sit ear table  
       'The dog is sitting by the table's ear.' *Bad with any reading.*
- b. Zuugwa'ah bèe'cw [cwe'eh me'es].  
       NEU.stand dog beside table  
       'The dog is standing beside the table.'

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<sup>4</sup> Ayoquesco Zapotec is not a Valley Zapotec language; it is spoken in "Santa María Ayoquesco de Aldama, District of Zimatlán, Oaxaca, Mexico" (MacLaury 1989: 119). MacLaury's comment is only a footnote in a paper which describes the system of metaphor. The focus of his paper is not to justify his assertion regarding the syntactic status of these words.

Locative BP phrases can also be substituted with non-BP PPs (5) or with locative proforms, such as 'there'.

- (5) Zuugwa'ah bèe'cw [trahsedeh me'es].  
NEU.stand dog behind table  
'The dog is standing behind the table.'

To specify that non-BP PPs and only those NPs that begin with a closed set of body part terms can occur as complements of locational verbs would be stipulative and miss an obvious generalization: body part terms used in locative expressions function differently from other body part words in the syntax; they form a syntactic category and they pattern syntactically and semantically with other prepositions in the language and, therefore, should be classified as syntactic prepositions.

## 2. Pilot Study of Acquisition of BP Locatives in SLQZ

This paper presents the results of two children tested in the pilot study: Soledad (1;6) and Graciela (2;3).<sup>5</sup> At the time, Soledad was learning SLQZ as her primary language and also had Spanish input. Graciela was learning both SLQZ and Spanish as her first languages.

The data suggest that the BP locatives are acquired as independent grammatical elements and their acquisition is not related to the acquisition of the corresponding body parts. Moreover, this dissociation between the acquisition of the BP locatives and the body parts supports my hypothesis that the locative terms are not synchronically metaphorical extensions of the nominal forms, as the locatives can be acquired without the BP nouns having been acquired. The results are consistent with an analysis of BP locatives as prepositions.

### 2.1. Experimental design

In order to test the children's understanding of body parts and BP locatives, two forced-choice, picture identification tasks were designed testing the eight words listed in Table 1. Each word was tested twice in each task; 16 questions for body parts and 16 questions for BP locatives for a total of 32 questions. The tests were run twice, on separate occasions.<sup>6</sup>

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<sup>5</sup> "Soledad" and "Graciela" are pseudonyms.

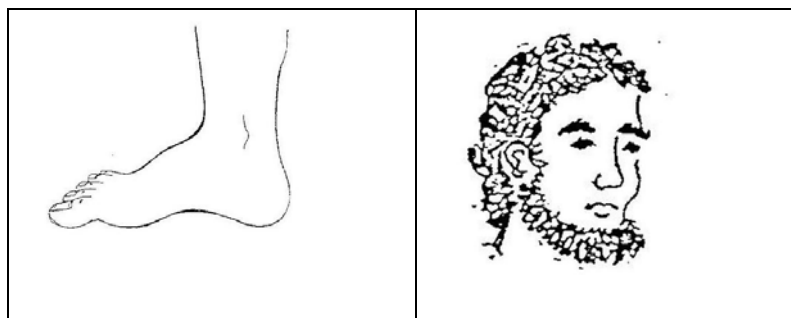
<sup>6</sup> The children were tested in their home during two sessions in March 2001. I was present during the tests, as were Silvia Lopez and sometimes the child's mother. Lopez is a native speaker of SLQZ and has worked as a linguistic consultant with Munro and me. Only one child was present during the test. The child was asked if she wanted to play a game. Lopez explained the game by saying that the child would hear a question while looking at the book, and she was to pick the picture that answered the question and every time she answered, she would get a sticker. Previous to this study, I had observed the children for another project, so they all knew me and were used to speaking Zapotec in front of me.

Table 1: Body Part Terms Tested

SLQZ	body part meaning	locative meaning
cwe'eh	'side'	'beside'
dehts	'back'	'behind'
gue'ehcy	'head'	'on top of'
lää'iny	'stomach'	'in'
lohoh	'face'	'on, in front of'
ni'ih	'foot'	'under, beneath'
ru'uh	'mouth'	'at the edge of'
zh:ää'a'n	'bottom'	'behind, under'

Along with each question, the child was shown two pictures (one that corresponded to the question being asked and one that did not). For example, the child was shown a picture of a foot and a picture of a head, in Figure 1 below, and was asked *Cu'an gue'ehcy bünny?* 'Where is the person's head?' The picture on the right (a head) corresponds correctly to the question, whereas the picture on the left (a foot) does not.

Figure 1: Sample Picture Pair for Body Part Test



### 2.1.1. Pre-test

A pre-test was conducted before the body part test, which introduced the child to the forced choice task. During this section, if the child was unresponsive after being asked the question, Lopez modeled how to choose a picture by pointing at the correct picture. This established the task of choosing and the method of choosing: pointing. Furthermore, the pre-test was used to introduce some of the pictures that would be used later in the body part locative test. The child's success in the pre-test showed that she could recognize the pictures and understand the task. As in the test itself, all answers given by the child were rewarded with verbal praise and a sticker regardless of whether the answer was correct or not.

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The pictures used in the tests were all black and white line drawings. All but one of the pictures used in these tests were adapted from Curtiss and Yamada (1987). The picture for *lää'iny* 'stomach' was drawn for me by Melissa Tai in the style of the CYCLE pictures.

### 2.1.2. Body part test

Every body part was tested twice, once with the correct answer on the left and the other with correct answer on the right, to control for the children having a bias for one side or another. Each body part was paired with a different distracter body part for the two trials. The question asked of the children for each pair was *Cu'an \_\_\_\_\_ biunny?* 'Where is the person's \_\_\_\_\_?' In SLQZ it is generally unnatural to have unpossessed body parts in sentences, thus *Cu'an ni'ih?* 'Where is the foot?', is viewed as awkward.

### 2.1.3. Body part locative test

As with the body parts, every BP locative was tested twice. Each time it was tested, it was tested opposite a different BP locative term and the matching picture occurred on different sides in each trial.

In addition, the type of locational verb used had to be controlled for. Unlike in English, there is no single VZ verb, like *is*, that can be used in any type of simple locative sentence, such as *The book is on the table*, or *The ball is beside the chair*. Instead, in SLQZ, there are a small number of locational verbs that can be used. In this test, five locational verbs were used.<sup>7</sup> In order to ensure that the only difference between the matching and non-matching pictures was the preposition, I chose pictures that could be described using the same locational verb, as verified by a native speaker.

The question asked of the children for each pair was on the model: *Cu'an FIGURE nih VERB PREP GROUND?* 'Where is the FIGURE that is PREP GROUND?'; for example, *Cu'an bèe'cw nih zùub ni'ih me'es?* 'Where is the dog that is under the table?' and *Cu'an ta's nih zùub loh me'es?* 'Where is the cup that is on the table?'<sup>8</sup>

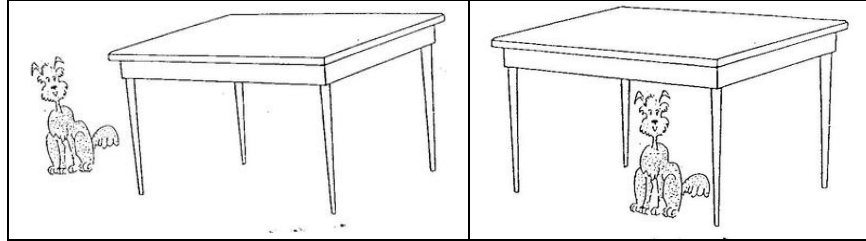
The following is a sample picture pair from the BP preposition test. The corresponding question to Figure 2 is *Cu'an bèe'cw nih zùub ni'ih me'es?* 'Where is the dog that is under the table?' (The picture on the right corresponds correctly with the question.)

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7 Bèe'b 'is located on' [usually a raised surface]; nàa'tga'ah 'is lying down, is (located) in a lying position'; nu'uh 'exists (in a location)' [often has a habitual sense]; zuu 'is standing, is located (standing)'; zùub 'is sitting; is located, exists (sitting or projecting).' Definitions from Munro and Lopez, et al. (1999).

8 I wanted to choose a question that was syntactically relatively uncomplicated while still natural. Upon consultation with Munro and Lopez, I decided that this question, though containing a relative clause, was the most natural way to ask the question.

Figure 2: Sample Picture Pair from Body Part Preposition Test



### 2.3. Results

A child was counted as knowing a certain word if they answered correctly for that word more often than they answered incorrectly. Because of the limited data, the results were not tested for statistical significance.<sup>9</sup> Therefore, the results can only be interpreted as suggesting trends.

#### 2.3.1. Results for Graciela (2;3)

Graciela (2;3) demonstrated knowledge of 7 of the 8 body parts tested: *cwe'eh* 'side' and *làa'iny* 'stomach' were identified correctly 4 out of 4 times; *gue'ehcy* 'head', *lohoh* 'face', *ni'ih* 'foot', and *zh:ààa'n* 'bottom' 3 out of 4 times; *ru'uh* 'mouth' was identified correctly 2 out of 3 times. She demonstrated knowledge of 4 of the 8 BP locatives: *làa'iny* 'in' and *zh:ààa'n* 'behind' she answered correctly 4 out of 4 times; *lohoh* 'on, in front of' and *ni'ih* 'under' she answered correctly 3 out of 4 times.

#### 2.3.2 Results for Soledad (1;6)

Soledad (1;6) demonstrated knowledge of 3 of the 8 body parts tested: *gue'ehcy* 'head' was identified correctly 4 out of 4 times; *dehts* 'back' and *lohoh* 'face' 3 out of 4 times. She demonstrated knowledge of 5 of the 8 BP locatives: *cwe'eh* 'beside', *lohoh* 'on, in front of', *dehts* 'behind' were identified correctly 4 out of 4 times; *ni'ih* 'under' 3 out of 4 times; *làa'iny* 'in' 2 out of 3 times.

### 2.4 Discussion of results

The acquisition of the body parts and the BP locatives can be classified into four patterns. In Patterns 1 and 2 either both the body part noun and the BP locative have been acquired or neither of them have. Patterns 3 and 4, on the other hand, exhibiting a *dissociation* between the acquisition of the body part and the BP locative. In these patterns one of the terms has been acquired but the other one has not.

In Pattern 1, neither the body part nor the BP locative have been acquired: e.g., *dehts* 'back' and 'behind' (Graciela). This pattern of acquisition is compatible with both an NP and a PP analysis of BP locatives. In Pattern 2, both

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<sup>9</sup> I hope to be able to replicate this study later with more participants.

the body part and the BP locative have been acquired: e.g., *dehts* 'back' and 'behind' (Soledad). This pattern of acquisition is also compatible with both an NP and a PP analysis of BP locatives.

In Pattern 3, the body part has been acquired, but the BP locative has not. Examples of this include *cwe'eh* 'side' (Graciela), *gue'ehcy* 'head' (Soledad, Graciela), and *ru'uh* 'mouth' (Graciela). An analysis of the BP locative terms as nouns with metaphorically extended meanings would have a difficult time accounting for this dissociation. Both of the children had acquired some BP locatives for which they had also acquired the corresponding body part (Pattern 2). If the BP locative meanings are derived through metaphor, then the fact that the children showed adult comprehension for some pairs might suggest that they have also acquired the metaphor “tools” they need. An NP analysis of BP locative phrases would have to account for the ability of the children to apply the metaphor in some cases and their inability to apply it in others.

Finally, in Pattern 4 the BP locative has been acquired, but the body part has not: *cwe'eh* 'beside' (Soledad), *lää'iny* 'in' (Soledad), *ni'ih* 'under' (Soledad). An analysis of the BP locative terms as nouns with metaphorically extended meanings could not account for this dissociation. If the locative meaning is based upon the body part nominal meaning, how could the child acquire the locative meaning without also having acquired the BP noun? If, instead, the BP locatives are prepositions, as I argue, this dissociation is in fact expected. One would predict that the BP nouns would be acquired as children acquire nouns, and that the BP prepositions would be acquired in the same order as children acquire prepositions.

Table 2 below summarizes this data; the cells that show a dissociation between the acquisition of the body parts and BP locatives have been shaded.

Table 2: SLQZ Acquisition of Body Part Terms

	meaning	Soledad (1;6)	Graciela (2;3)
cwe'eh	'side' (n)	No	<b>Yes</b>
	'beside' (prep)	<b>Yes</b>	No
dehts	'back' (n)	<b>Yes</b>	No
	'behind' (prep)	<b>Yes</b>	No
gue'ehcy	'head' (n)	<b>Yes</b>	<b>Yes</b>
	'on top of' (prep)	No	No
lää'iny	'stomach' (n)	No	<b>Yes</b>
	'in' (prep)	<b>Yes</b>	<b>Yes</b>
lohoh	'face' (n)	<b>Yes</b>	<b>Yes</b>
	'on' (prep)	<b>Yes</b>	<b>Yes</b>
ni'ih	'foot' (n)	No	<b>Yes</b>
	'under' (prep)	<b>Yes</b>	<b>Yes</b>
ru'uh	'mouth' (n)	No	<b>Yes</b>
	'at the edge of' (prep)	No	No
zh:ää'a'n	'bottom' (n)	No	<b>Yes</b>
	'under' (prep)	No	<b>Yes</b>



## 2.5. Acquisition data from another VZ language: SMTZ

There are other data that further substantiate the dissociation between the BP nouns and prepositions in the acquisition of Zapotec. Jensen de López (2002) reports the results of a longitudinal study of one child acquiring San Marcos Tlapazola Zapotec (SMTZ) (from age 1;3 to 2;9). At the end of this study, the child reportedly used four of the BP terms in locative constructions: *làani* 'in' and *quia* 'on' (as of 2;0;12); *lo* 'on' (as of 2;3;23); and *dets* 'behind' (as of 2;6).

Jensen de López (1999) reported data from the same SMTZ-acquiring child at age 2;9 years. By this time, the child is reported to use one additional BP term in locative constructions: *ruu* 'at the edge of.' In Table 3 I present Jensen de López's (1999) data, showing for each BP term whether the child used that term in either the nominal body part meaning or the locative meaning.

Table 3: *Body Parts and Locatives Produced by SMTZ Acquiring Child 2;9\**

SMTZ Body Part Term <sup>10</sup>	Body Part Meaning	Used as Body Part	Used as Locative
<i>làani</i>	'stomach'	No	Yes
<i>lo</i>	'face'	Yes	Yes
<i>quia</i>	'head'	No	Yes
<i>ruu</i>	'mouth'	No	Yes
<i>dets</i>	'back'	No	Yes
<i>nii</i>	'foot'	Yes	No

\*Modified from Jensen de López's Table B (1999: 17).

As in my data on the acquisition of SLQZ, the SMTZ acquisition data also show two types of dissociation within the acquisition of BP nouns and prepositions; these cells are marked with shading. Pattern 3, the acquisition of the body part but not the BP preposition, can be seen for *nii* 'foot' and Pattern 4, the acquisition of the BP preposition but not the body part, can be seen for *làani* 'in', *quia* 'on', *ruu* 'at the edge of', *dets* 'behind'. These results are consistent with the data found in my pilot study and support the hypothesis that there is a categorial distinction between the BP nouns and locatives.

## 2.6 Comparison with cross-linguistic acquisition of prepositions

How does the acquisition of Zapotec prepositions compare with the acquisition of prepositions in other languages? Cross-linguistically, the first prepositions to be acquired are 'in' and 'on', then 'under' and 'beside', then 'front' and 'back' of things that have inherent fronts and backs, and finally 'front' and 'back' of things with no inherent fronts or backs, as exemplified by several languages in Table 4.

<sup>10</sup> The SMTZ data are presented in the orthography used by Jensen de López (1999, 2002).

Table 4: Cross-Linguistic Order of Acquisition for Prepositions\*

Language → Order ↓	English	Turkish	Serbo- Croatian	Italian	Hebrew
1	in on	in on	on in	in on	in on
2	under beside	under beside	beside under	under beside	beside
3	in front <sub>F</sub> of in back <sub>F</sub> of	in front <sub>F</sub> of in back <sub>F</sub> of	in front <sub>F</sub> of in back <sub>F</sub> of	in front <sub>F</sub> of in back <sub>F</sub> of	behind
4	in back of in front of	in back of in front of	in back of in front of	in back of in front of	under

\* *Back<sub>F</sub>* and *front<sub>F</sub>* refer to objects that have inherent fronts and backs as opposed to *front* and *back*, which refer to objects with no inherent front or back. The data from English, Turkish, Serbo-Croatian, and Italian is from Johnston and Slobin (1979). The Hebrew data is from Dromi (1979).

The acquisition of BP prepositions in VZ, as presented in Table 5, is consistent with the cross-linguistic data. The hypothesis in this paper predicts that the BP locatives in VZ languages would be acquired as other prepositions are cross-linguistically, and the SLQZ and SMTZ data seem to bear out this prediction, offering further support for their classification as prepositions.

Table 5. Summary of Acquisition of Prepositions by VZ-Acquiring Children

<u>Soledad 1:6</u>	<u>Graciela 2:3</u>	<u>SMTZ child 2:6</u>	<u>SMTZ child 2:9</u>
'in'	'in'	'in'	'in'
'on'	'on'	'on'	'on'
'under'	'under'	--	--
'in front of'	'in front of'	'in front of'	'in front of'
'behind'	'behind'	'behind'	'behind'
'beside'	--	--	--
--	--	--	'on top of'
--	--	--	'at the edge of'

### 3. Conclusions

There is no evidence that the fact that BP prepositions are homophonous with body part words affects their acquisition. Patterns of dissociation, such as the fact that the Soledad (1;6) had acquired *lâa'iny* 'in', but not *lâa'iny* 'stomach' and *ni'ih* 'under', but not *ni'ih* 'foot', seem to be the strongest evidence in support of a grammatical dissociation between the words. If the child acquires 'in' before 'stomach', how can the child's use of 'in' be a metaphorical extension of 'stomach'? Similar patterns of dissociation were also found in Jensen de López's (1999, 2002) study on the acquisition of SMTZ.

This may have implications for adult grammar as well, since children acquire BP locatives as separate lexical items and do not derive the location sense of the BP term from the BP noun. If one wished to argue that adults derive the meaning of nominal BP locatives from body part terms through active

metaphor, one would have to specifically address the issue presented by the acquisition data in SLQZ and SMTZ.

There is no evidence from my data that the VZ-learning children acquire prepositions in a different order than children acquiring any other language. I have previously argued that in VZ, BP terms used in locative expressions should be classified as prepositions, based on syntactic and semantic evidence from adult language in several VZ languages. In this paper, I presented data from child acquisition of VZ that further supports this categorial distinction between body parts and BP locatives by showing a dissociation between the acquisition of the body part and the corresponding locative expressions.

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Department of Linguistics  
3125 Campbell Hall  
Box 951543  
Los Angeles, CA 90095-1543  
*sheriver@ucla.edu*  
*http://brooklynne.dnsalias.net*