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# Facing the Sunrise: Cultural Worldview Underlying Intrinsic-Based Encoding of Absolute Frames of Reference in Aymara

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## Abstract

The Aymara of the Andes use absolute (cardinal) frames of reference for describing the relative position of ordinary objects. However, rather than encoding them in available absolute lexemes, they do it in lexemes that are intrinsic to the body: *nayra* (“front”) and *qhipa* (“back”), denoting east and west, respectively. Why? We use different but complementary ethnographic methods to investigate the nature of this encoding: (a) linguistic expressions and speech–gesture co-production, (b) linguistic patterns in the distinct regional Spanish-based variety *Castellano Andino* (CA), (c) metaphorical extensions of CA’s spatial patterns to temporal ones, and (d) layouts of traditional houses. Findings indicate that, following fundamental principles of Aymara cosmology, people, objects, and land—as a whole—are conceived as having an implicit canonical orientation facing east, a primary landmark determined by the sunrise. The above bodily based lexicalizations are thus linguistic manifestations of a broader macro-cultural worldview and its psycho-cognitive reality.

*Keywords:* Cognitive ethnography; Spatial frames of reference; Gesture; Everyday cognition; Language and thought; Embodied cognition; Aymara; Whorfian hypothesis

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## 1. Introduction

Humans describe the relative position of everyday physical objects using various spatial frames of reference (FoR). The resulting descriptions are expressed in linguistic FoR, which can be established relative to the observer as in the English expression *he is to the left of the house*, or defined in terms of intrinsic properties of the objects involved as in *he is in the front of the house*, or specified in absolute terms that are extrinsic to the objects in question

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as in *he is north of the house*. These three forms are referred to as *relative* (sometimes also called *egocentric*), *intrinsic* (sometimes called *object-centric*), and *absolute* FoR, respectively (Levinson, 2003). Research has shown that, for a given scene, speakers of different languages around the world use these FoR differently. For instance, while English speakers would typically privilege an absolute FoR to refer to large-scale space as in *the lake is north of the forest*, they would use a relative FoR to describe a small-scale (“tabletop”) scene, as in *the glass is to the left of the bottle*. To describe this tabletop scene, however, speakers of other languages, such as Guugu Yimithirr—a native language of Australia—would privilege an absolute FoR using an expression equivalent to *the glass is north of the bottle* (Haviland, 1993). Over the last couple of decades, the diversity of linguistic spatial FoR (Levinson & Wilkins, 2006) has become a paradigmatic case study for the testing of the Whorfian hypothesis, which states that the properties of a language shape, in a fundamental way, how people think and conceptualize the world (Whorf, 1956). By means of experimental approaches in the tradition of cognitive psychology, research has produced, using language elicitation methods (Levinson, 2003) and cognitive strategy preference tasks (Haun, Rapold, Janzen, & Levinson, 2011), important cross-cultural evidence supporting the claim that, at least in the domain of space, language seems to restructure cognition (Levinson, 2003; Majid, Bowerman, Kita, Haun, & Levinson, 2004).

Several languages have been reported to have their speakers favoring absolute FoR, even when describing relative positions of small-scale ordinary objects. For instance, other than the case of Guugu Yimithirr mentioned above, speakers of Tenejapan Tzeltal (from Meso-America) have been documented to use a downhill/uphill distinction for describing relative positions of objects in tabletop space (Levinson, 1996a,b, 2003; Majid et al., 2004). Similar patterns of such uses of absolute FoR have been found among speakers of Balinese (Wassmann & Dasen, 1998) as well as of other languages in India and Nepal (Dasen & Mishra, 2010). Typically, the absolute FoR are encoded in lexical items that refer directly to an absolute coordinate system *external* to the objects whose spatial locations are compared: via extrinsic topographic distinctions (hills, valleys, shorelines) or cardinal points (east, sunrise).

When describing relative positions of ordinary objects, the Aymara of the Andes also use absolute FoR, especially involving east/west cardinal distinctions, for which their language has specific extrinsic sun-based lexemes—*inti-jalsu* (sun-rise) and *inti-jalanta* (sun-set). Interestingly, however, Aymara speakers encode the absolute FoR in lexical items that are not extrinsic or absolute per se, but rather, object-centric—*intrinsic* to the body (or to a canonical oriented object)—via the lexemes *nayra* (literally “front,” “sight,” “eye”) and *qhipa* (“literally,” “back,” “behind”). Aymara speakers thus can refer to a neutral object *A* located to the *east* of an object *B* as being *nayra* relative to *B*, and *B*, as being *qhipa* relative to *A*. In other words, an Aymara speaker can make use of *intrinsic* spatial reference terms to denote *absolute* FoR such as east and west, despite the availability of specific sun-related extrinsic terms for cardinal orientations. Why would Aymara speakers do this, if the language they speak is endowed with the necessary linguistic elements for directly encoding absolute FoR? Why are the intrinsic terms front/back, rather than the existing absolute sun-based terms, recruited for expressing absolute FoR? And how is the corresponding encoding achieved? Is there any logic underlying the *absolute* meaning given to those *intrinsic* terms?

It is common to find languages that nomenclaturally relate east with the raising of the sun and west with the setting of the sun. In a survey of the origin of cardinal direction terms based on 127 globally distributed languages, Brown (1983) showed that nearly half of them exhibit this pattern (58 and 59, respectively). But, interestingly, only 4 of the 127 languages nomenclaturally relate east with front (and are not indicated as relating east with the raising of the sun), and three nomenclaturally relate west with back (from which only one language—Dyola—also relates it with the setting of the sun). From these data, however, it is not possible to know whether in these rare cases such terms are (a) used for describing the relative position of everyday objects via an east–west absolute FoR, and (2) whether the body-based meaning of these intrinsic terms has any psycho-cognitive reality in the speakers of these languages.

Traditionally, the research in spatial FoR—perhaps driven by the investigation of the Whorfian hypothesis—has focused on establishing *that* there are (or there are not) linguistic differences that affect spatial cognition. Less effort has been devoted to address the question of *why* such linguistic differences arise in the first place. Within the framework of the Whorfian hypothesis, linguistic structure is usually taken as pre-given, thus de-emphasizing the investigation of what nonlinguistic phenomena—cultural, environmental, or otherwise—may play a role in producing the very linguistic diversity hypothesized to affect cognition. Indeed, it could be the case that broader macro-cultural factors co-defined with environmental ones may be affecting both at once, language structure *and* cognition. In this article, we focus on the questions of *why* Aymara speakers use the intrinsic-based encoding of absolute FoR, and of *what* type of phenomena motivates it. We will argue that there are systematic macro-cultural factors—that are not linguistic proper—which, being observable in a variety of nonlinguistic domains, help explain the usage of such linguistic encoding of intrinsic-for-absolute FoR.

Following on an ethnographic study of spatial construals of time in Aymara (Núñez & Sweetser, 2006), and going beyond a purely etymological and linguistic investigation, here we approach the above questions through various empirical observations coming from different but complementary sources. First, we investigate the psychological reality of the eastward orientation in everyday life as manifested through spatial linguistic expressions that are co-produced with largely unconscious motor action in real time—spontaneous gestures. Second, we analyze the presence of relevant features in the distinct regional Spanish-based linguistic variety known as *Castellano Andino* (CA)<sup>1</sup> or “Andean Spanish” where specific constructions dealing with ahead/behind relationships come from the clash between the substratal form and the superstratum Spanish. Third, we investigate extensions of these spatial patterns in CA to metaphorical expressions involving spatial construals of time. And fourth, we study the materialization of the primacy of the eastward orientation as manifested in urban layouts and house orientations. Based on previous anthropological research, we then analyze some core aspects of the Aymara culture, which, building on the primacy of the sunrise, sustain a variety of social practices—from sacred rituals to urban planning to the details of everyday life—that provide a robust and ubiquitous absolute (cardinal) FoR. Further, we show that the absolute cardinal points east and west are lexically marked on the basis of a specific relation with a canonical body orientation provided by the worldview that construe

community (including people, objects, and land) as having an implicit canonical orientation facing east. As a result, east locations are conceived and linguistically expressed as “in front” of people (and objects) and west locations as “behind” them.

We argue that a large cultural framework is needed for understanding the centrality of the eastward orientation and the resulting body-based intrinsic lexicalizations used to characterize such absolute (cardinal) spatial FoR in Aymara. We conclude that the underlying macro-cultural symbolic constructions—shaped by the primacy of the sunrise—are not just abstract-collective ideologies but that they manifest themselves in specific ways through people’s ordinary cognitive activities, from spontaneous gestures to the building of houses and urban layout.

## 2. The Aymara community

The Aymara community has lived in the Andes mountains for centuries, developing an agricultural economy based on the cultivation of potatoes, corn, and quinoa, and the domestication of llamas, alpacas, and vicuñas (Van Kessel, 1996a; Zapata Tarrés, 2001). Currently, the community has a population of about 2 million people, who live in mid-western South America, in what corresponds to Central and Western Bolivia, Southern Peru, Northern Chile, and, to a lesser extent, Northwestern Argentina (Köster, 1992). The largest concentration of the Aymara population is found in the highland plateau of the Andes Mountains, between the shores of the Titicaca Lake and what is today the Bolivian-Chilean border. This ancestral community belongs to a culture that evolved in the ecologies of the Andes Mountains and highlands. This region has an elevation ranging from 2,000 to 4,000 m above sea level and it is characterized by a scarcity of rain—and, therefore, vegetation—and a large thermic amplitude. The geographical profile of this region is constituted by a vast plateau, which allows the gathering of shallow waters coming from the mountains’ melting snowpack. The Aymara language is the second largest in the Andes region after Quechua. The two languages, whose territories overlap in areas of southern Peru, belong to distinct linguistic families (Jaqi and Quechua, respectively), so many of their similarities can be understood in terms of mutual influence or convergence (Cerrón Palomino, 1982; Hardman, 1988; Layme Pairumani, 1992).

The Aymara community in Chile, where this study was conducted, has a population of approximately 48,000 people (this according to the Chilean 2002 census, and based on the criterion of ethnic self-identification; INE, 2008). Out of this group, only 2,300 people live in their original territories in the mountains. Most of the Aymara people in Chile have emigrated toward the nearby ports (Iquique, Arica) and mining regions, where they have mixed with working-class groups coming from other areas of Chile (Grebe, 1986; Van Kessel, 1996b). As Spanish takes over, the Aymara language is gradually disappearing from the Chilean Andes (Núñez & Sweetser, 2006). Currently, the Aymara population in the Chilean mountains above the age of 40 is mostly bilingual and only a very low percentage is monolingual Aymara (most of them are elderly). Based on the native language criterion, the 2002 census indicates that the Aymara population in Chile counts 8,500 people (INE, 2008).

### 3. Method

This study was conducted through ethnographic observations of Aymara communities living in the mountains of the Tarapacá region of Northern Chile, along the border with Bolivia. More specifically, the towns covered in this study were Cariquima, Chijo, Chulluncane, Enquelga, Isluga, and Villablanca. It included videotaped interviews with native Aymara speakers (monolingual and bilingual) as well as statistical and photographic documentation of the layout of houses and towns. Approximately 14 h of raw videotaped interviews were obtained and later captured digitally for audio and video analysis.

#### 3.1. *Participants*

Eighteen Aymara speakers voluntarily agreed to participate in the interviews (8 men, 10 women). The participants were all adults over 40 years of age. As one of the goals of this study was to investigate the use and manifestation of spatial FoR in traditional Aymara language and culture, it focused on adult speakers only (in the Chilean community, young children and teenagers have, at best, only a rudimentary knowledge of the language). Most elderly individuals in the remote areas we covered grew up before the Chilean formal educational system implemented systematic schooling in the region (in Spanish). The majority of our participants managed to informally learn some form of Spanish (usually CA) only in their mid-to-late teens.<sup>2</sup>

#### 3.2. *Procedure*

##### 3.2.1. *Interviews*

The main purpose of the interviews was to gather information about native speakers' everyday uses of spatial and temporal reference through the elicitation of spontaneous linguistic expressions and speech-gesture co-production. We paid special attention to gestural data because they offer crucial complementary information unavailable from purely linguistic data, revealing aspects of thinking and conceptualizing that lie beyond conscious awareness (McNeill, 1992, 2000, 2005) and, therefore, are largely unavailable for introspection and for traditional anthropological informant-based approaches. The close link between oral and gestural production has been demonstrated in many domains, from child development, to experimental psychology, to neuroscience, to linguistics. Research has shown that gestures accompanying speech are universal (McNeill, 1992; Núñez & Sweetser, 2006) and that they are less monitored than speech. Speakers are often unaware that they are gesturing at all (McNeill, 1992). Besides, gestures are produced in astonishing synchronicity with speech (McNeill, 1992), and in children they develop in close relation with speech (Bates & Dick, 2002; Iverson & Thelen, 1999). Also, gestures provide complementary content to speech (Goldin-Meadow, 2003) in that speakers synthesize and subsequently cannot distinguish information taken from the two channels (Kendon, 2000). Importantly, gestures are often co-produced with metaphorical thinking, where linguistic metaphorical mappings are paralleled systematically in gesture (Cienki, 1998; Cienki & Müller, 2008; McNeill, 1992; Núñez,

2006; Núñez & Sweetser, 2006), playing an important role in metaphor comprehension that can be documented with electrophysiological observations of brain activity (Cornejo et al., 2009). More specifically, in Aymara, it has been shown that the gestural track clarifies aspects of the metaphoric spatial construals of time, which are not clear from linguistic data alone (Núñez & Sweetser, 2006). With respect to the study of FoR, the relevance of gesture has been established in two recent reports: In a study among Yucatec Mayas, which shows that their preferred spatial FoR (absolute, geocentric) is sometimes (especially among women) only detectable through the analysis of co-speech gesture and not through speech alone (Le Guen, 2011), and in a recent study of spatial construals of time among the Yupno of Papua New Guinea where the spatialization of concepts (absolute, topographic) is almost exclusively observable via gesture, not via linguistic terms (Núñez, Cooperrider, Doan, & Wassmann, unpublished data). In sum, we considered that the examination of real-time gestural production was highly relevant in this study in that it provides ecologically valid information of the cognitive reality of the construals under investigation, which are not available to traditional linguistic, etymological, psychometric, and informant-based methods.

In order to maximize ecological validity, interviews were informal in nature—being as close as possible to an ordinary conversation. They usually lasted 20 to 40 min and took place inside a house or outside in a patio. The interviews were conducted by an Aymara-Spanish bilingual assistant and the two authors (Chilean-Spanish native speakers). Depending on the context and the language preference of the participants, interviews took place in Aymara, in Spanish, and sometimes in both, with occasional use of CA. With the consent of the participants, the sessions were videotaped. The video camera was placed in the peripheral visual field of the interviewee, usually outside the immediate space where the conversation took place. The interview had two main parts. In the first part, participants were asked to talk about, make comments, compare, and explain issues involving locations and positions in space as well as everyday stories regarding temporal events that had occurred or that were expected to occur in the context of their communities. In the second part, participants were asked to talk about traditional “sayings,” anecdotes, and expressions in Aymara involving space and time and to give examples of them. In the case of bilingual interviews, participants were asked to translate expressions from Spanish to Aymara and vice versa and to explain them. These expressions were taken from everyday language and from academic texts on Aymara language (Albó, 1988; Bertonio, 1612/1984; Briggs, 1993; Gallego, 1994; Grebe, 1990; Hardman, Vásquez, & Yapita, 1988; Miracle & Yapita, 1981; Tarifa, 1969). The course of the interviews was overall rather flexible and open-ended, and the interaction was often quite fluid.

### 3.2.2. *Documentation of the orientation of houses and buildings*

In order to keep record of the orientation of the houses and buildings, we took pictures of them and kept—for each town<sup>3</sup>—statistical information regarding the number of houses and buildings and their orientation with respect to the cardinal points north, south, east, and west. We defined “orientation” as the direction to which the front of the house (or building) was facing (i.e., the “front” of the house being the side with the main entrance to the structure). Most pictures were taken early in the morning or late in the afternoon in order to



optimize the visualization of the orientation of the houses and buildings relative to their shades (toward the west in the morning and toward the east in the afternoon).

## 4. Ethnographic data

### 4.1. Spatial linguistic expressions and speakers' speech–gesture co-production

The interviews and ethnographic observations of daily interactions with Aymara speakers indicate that they use absolute FoR (east–west) to refer to spatial positions of ordinary objects, but that they do it by means of the Aymara lexemes *nayra* and *qhipa*, which are also used to denote body parts and orientation—*nayra* (“face,” “front,” “eye”) and *qhipa* (“back,” “behind”).

The following Aymara linguistic expressions illustrate this phenomenon:

- (1) *Simintiryu marka qhipaxan[a]kiwa* (“the cemetery is located on the western side of town”) literal gloss:

<i>simintiryu</i>	borrowing from Spanish <i>cementerio</i> (“cemetery”)
<i>marka</i>	town (capital, head-town)
<b><i>qhipa</i></b>	<b>back/behind</b>
- <i>xa</i> -	locative meaning on the side
- <i>na</i> -	locative for nonhuman locations
- <i>ki</i> -	independent suffix that in this case limits a location to exclusively one place
- <i>wa</i> -	sentential suffix that denotes an affirmative first-hand report

- (2) *Anuxara palas nayraxatankiwa* (“the dog is on the eastern side of the square”) literal gloss:

<i>anuxara</i>	dog
<i>palas</i>	borrowing from Spanish <i>plaza</i> (“square”)
<b><i>nayra</i></b>	<b>eye/sight/front</b>
- <i>xa</i> -	locative meaning on the side
- <i>na</i> -	locative for nonhuman locations
- <i>ki</i> -	independent suffix that in this case limits a location to exclusively one place
- <i>wa</i> -	sentential suffix that denotes an affirmative first-hand report

In English, the physical features used to describe spatial positions of objects—such as “in front” and “behind”—are often *intrinsic*, that is, they have their objects themselves as reference points (e.g., “In front of the school” means in front, from the point of view of a canonical observer standing at the school’s main door looking outward, irrespective of the real observer’s position). Interestingly, the examples above show that Aymara speakers use lexemes ultimately based on body referents, which in Indo-European languages are typically recruited to characterize spatial FoR based on intrinsic features (e.g., *he is in front of the house*), to indicate *absolute* spatial descriptions involving east–west orientations. In Aymara, the construal of the form “the house is *nayra* (‘fore’, ‘front’) the school” is driven

by the house's location east of the school, and this, irrespective of the orientation of the buildings themselves. Similarly, "the social club is *qhipa* ('behind') the school" is motivated by the club's location to the west of the school. Thus, Aymara speakers use intrinsic features of canonically oriented bodies—such as front and back—to encode *absolute* FoR.

This pattern is also expressed when referring to people's spatial locations. We found the following example illustrating a case in which such absolute FoR is used to characterize the spatial arrangements of four people sitting around a table. Moreover, the example shows that Aymara bilingual speakers can exhibit this pattern not only when speaking Aymara, but when speaking Spanish (or CA) as well. In this particular situation, we were involved in a conversation with two Aymara bilingual speakers inside a house. We were sitting around a rectangular table whose main axis was oriented north–south (see Fig. 1, the camera is facing south). The two Aymara speakers are sitting in front of each other, across the table (away from the camera). Speaker 1 (top right of the screen) is facing east and Speaker 2 (top left of the screen) is facing west. We are sitting next to them, one on each side (near the camera).

At some point, Speaker 1 (top right of the screen), referring to his position says in Spanish *Yo estoy aquí, en qhipa* ("I'm here, at *qhipa*"). As he utters that sentence, he is making eye contact with Interviewer 2 (bottom left of screen) and brings his right hand toward his chest (palm toward body; see Fig. 1A). Three seconds later, he completes the idea by saying *ustedes están en layra*<sup>4</sup> ("you are in front") as he fully extends his right arm and points directly in front of him (Fig. 1B).

Seven seconds later, Speaker 1 further explains why he is at *qhipa*, and says *Tamos atrás, poh, ... estamos atrás de ellos* ("We are behind, see, ... we are behind them"). He uses the first person plural because he is referring to the relative position he and Interviewer 1—sitting next to him—have with respect to the two other interlocutors facing them across the table. As he utters, the first part of that speech unit—"we are behind"—he rapidly (approximately 270 ms) moves both his arms (symmetrically) from a relatively extended position away from his body (Fig. 2A) toward the center of his chest (Fig. 2B). For Speaker 1 to say that he is *behind* someone sitting across the table *directly facing* him is quite remarkable.



Fig. 1. The authors (below) are involved in a conversation in Spanish/Castellano Andino with two bilingual Aymara speakers (top). As Speaker 1 (top right) says, "I'm here, at *qhipa* ('behind')" he brings his right hand to his chest (A). Then, he adds, "you are at *layra* ('front') and points in front of him (B). The time code shown at the bottom right of each freeze is expressed in *minutes:seconds:frames*. Each *frame* unit corresponds to approximately 1/30 of a second (there are 29.97 frames/s).





Fig. 2. The speaker on the right describes the position he and an interviewer sitting next to him (to his left, but not visible here) have relative to the two interlocutors facing them across the table. As he says in Spanish *estamos atrás de ellos* (“we are behind them”), he rapidly moves both his arms from a relatively extended position away from his body (A) toward the center of his chest (B). The speaker thus says that he is *behind* someone sitting across the table *directly facing* him.

The use of the bodily based terms *nayra* and *qhipa* to refer to east–west absolute FoR is then not just a matter of words; not just a fossilized linguistic phenomenon. Co-speech gesture shows that the primacy of eastward orientation as an absolute FoR, coded via body-based lexemes, does have a cognitive psychological reality as it involves (largely unconscious) motor action in real time tightly coordinated with speech.

#### 4.2. Linguistic patterns involving space in local CA

Many Aymara speakers are bilingual between Aymara and the distinct regional Spanish-based linguistic variety CA. Among southwestern Aymara speakers, a majority are Aymara–CA bilingual to varying degrees, and some are also familiar with more standard dialects of Chilean Spanish. CA shows important influences from its speakers’ Native American language substrates. Aymara-spoken CA, for example, uses Spanish pluperfect tense forms as evidential markers indicating lack of direct personal knowledge of a described past event (Miracle & Yapita, 1981). Although evidentiality is a category not grammatically marked by Spanish tenses, the use of pluperfect forms in CA contrasts with Spanish perfect and imperfect forms, which are used to mark aspect. Similarly, CA uses front/back relationships in a way that reveals the clash between the demands existing in the Aymara substratal manner of describing spatial positions and the grammatical constraints imposed by the superstratum Spanish. Here are some examples.

While conducting our ethnographic observations, one day we (the authors) were driving our pick-up truck southward—from Colchane to Cariquima—through a small and straight dirt road on a flat, widely open, and dry landscape. We were giving a ride to a woman from Cariquima, who was sitting right behind the driver (one of us). At some point, we could see, still far away in front of us, a very small town (constituted by a few houses only). Then the woman instructed the driver in CA: *Váyase por atrás* (“go through the rear [side]”). As in Spanish that sentence did not have any obvious meaning given the context (there was only one very isolated dirt road we could follow at that moment), we asked her what she meant. She looked perplexed that it was not immediately obvious to us what she meant. So

she reached toward the front seat (closer to the driver) and while adding *Pase por atrás del pueblo* (“go through the rear side of the town”) she gestured with her right hand describing a trajectory that went around (toward her right) an imaginary central location, as if she was describing the path we were supposed to take to get past the town once getting there (i.e., by contouring it over the right side, from the perspective of the driver). Although this time we understood what she meant, we did not know why she expressed that idea using the Spanish term *atrás* (“behind,” “back”). So we asked her why she had said so, and she replied, very matter-of-factly, *porque allá es donde sale el sol* (“because there [pointing east] is where the sun rises”). That brief explanation settled the discussion: The “front” of the town was construed as the side toward the sunrise (east), so with the Spanish word *atrás* she meant the opposite side of the town, that is, to the right of our road at the moment of traveling.

Other members of the community would produce many more examples of such uses of CA where ahead–behind relationships are defined with respect to the sunrise. For instance, referring to the road we used to enter to Cariquima, which reaches the town from the lower lands located to the west of it, a local woman said to us: *A Cariquima, ustedes llegaron por atrás* (“To Cariquima, you arrived from behind”). For a Spanish-speaking visitor this is highly confusing, since in a prototypical case, if one arrives to a town via the only possible road (especially if going uphill), then one implicitly construes the “front” part of the town as the side “facing” the driver at the moment of arrival. In Cariquima, this is, to the eyes of a non-Aymara person, clearly marked by the series of signboards that announce the arrival to the town (i.e., official signboards displaying the name of the town, road indications, etc.). This side of town, however (the western side), is not the frontal side for the Aymara community, but the rear part of the town.

In another situation, we were inside a house in Cariquima with a woman who was preparing dinner for us. Earlier, she had sent us to buy bread and eggs to a house that happened to be located in the easternmost line of houses in town. Later, when she had to refer to that location she said: *Ahí, adelante, donde ustedes compraron pan y huevos* (“There, ahead, where you bought bread and eggs”). Once again, the use of the expression *adelante* (“ahead”) in such context is—in standard Spanish—highly confusing. In fact the very house where we bought bread and eggs was located completely opposite to the town entrance via the main road, the side of the town that Spanish speakers would identify as being the “front” one. If the east–west axis had to be invoked for identifying the position of the house in question, a Spanish speaker in this case would say that it is “behind” the town, not “ahead” of it. But CA uses the bodily based Spanish lexeme *adelante* (“ahead”) to code for the implicit Aymara absolute FoR facing east.

These construals are not simply a matter of words but of actual conceptualization in realtime with empirically observable cognitive psychological reality. In the following example, a woman, bilingual Aymara–CA (but not fluid in Spanish), is explaining where her neighbors live. She is sitting facing north, to the north of where her house is (see Fig. 3).

Initially, she is referring to the fact that nobody lives in the house next to her (on the western side, see Fig. 3, location “N1”) as the tenant is now in a town called Alto Hospicio located far away westward in much lower lands, almost at sea level.<sup>5</sup> She says *no, no, ...*

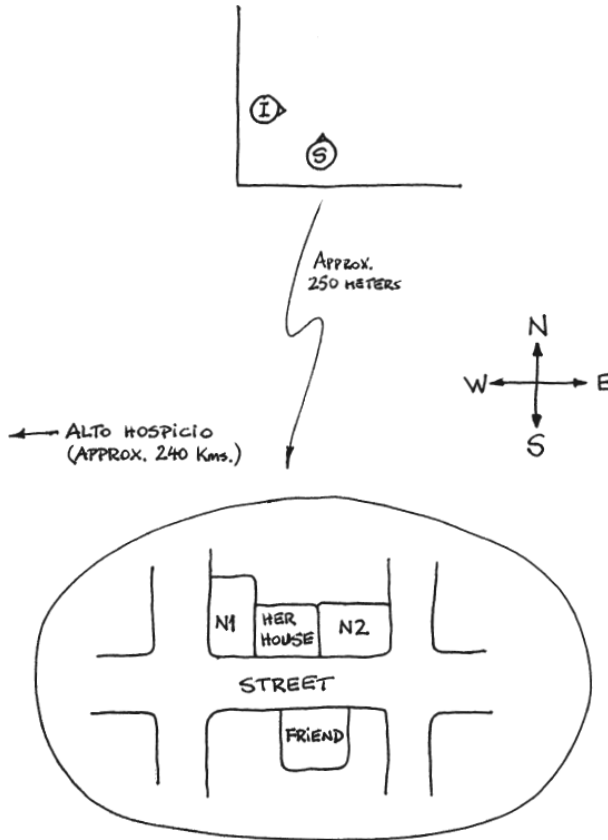


Fig. 3. A schematic depiction showing the relative position of the location of the interview with a bilingual Aymara–CA woman and the neighborhood where she lives. She is sitting facing north (top of the figure, indicated by ‘‘S’’) next to the interviewer (‘‘I’’). The interview takes place to the north of where she lives, approximately 250 meters away from her house. Her friend Ignacia lives across the street from her. Houses N1 and N2 are empty.

*vive ahí atrás de mi casa, ... vive Alto Hospicio* (‘‘no, no[body], ... lives there behind my house, ... [the neighbor] lives Alto Hospicio’’). As she says *atrás* (‘‘behind’’), she points to the west (to her left) with her left hand (B-handshape, palm toward up; Fig. 4A–C).

She completes her explanation 2 s later, and as she refers to the place where her neighbor moved (Alto Hospicio), she now points with the same hand toward her back (B-handshape, palm down; Fig. 4D). At this point, she has now re-positioned the absolute east–west cardinal points with the east-is-ahead and west-is-behind Aymara canonical orientation of the body. As the canonical body faces east, the new location to which her neighbor moved to is located behind her canonically oriented body. Then, five seconds later, she adds that *Al frente, sí [vive alguien], ... mi vecina la Ignacia*<sup>6</sup> (‘‘In front, yes [someone does live], ... my neighbor Ignacia’’). As she mentions the name of her friend, she overextends her straight left arm backward and points with a loose hand (palm toward down) toward the location that roughly corresponds to where she and her friend Ignacia live,



Fig. 4. A bilingual Aymara–CA woman describing various locations in her neighborhood. First, she explains that nobody lives in the house to the west of hers. Precisely as she says *atrás* (“back”) in the expression *ahí atrás de mi casa* (“there behind my house”), she points to the west (to her left) with a fast movement of her left hand (A–C). She continues by saying that the neighbor to the west of her house has moved to the town called Alto Hospicio (located far away to the west in the lowlands). As she mentions the name of the town she points backward with her left hand over the shoulder (D), thus re-positioning herself relative to the absolute east–west cardinal points with the east-is-ahead and west-is-behind Aymara canonical orientation of the body. Four seconds later, she points to the house where a friend of hers lives (E) overextending her straight left arm backward. While building up to this pointing position, she describes the location as being *al frente* (“at the front”), which in this case corresponds to the standard Spanish meaning “across the street.” Finally (F), she further explains that nobody lives at the east of her house, either, making implicit reference to the empty house to the east of hers that she had described 10 s earlier (D). At this point, she regains the canonical bodily orientation adopted earlier and points to the front, indicating the “east.”

approximately 250 m away (Fig. 4E). Interestingly, at the moment of pointing she used the Spanish expression *al frente* (“front”)—even though she is pointing backward—thus conveying the standard Spanish meaning “at the front” (which in this case means, across the street from her place, where her friend Ignacia lives, see Fig. 3). Finally, four seconds later, and coming back to the recent earlier reference to the empty house to the west of hers,

she completes her description by saying *y adelante tampoco no vive* (“and ahead doesn’t live [nobody lives], either”). Co-timed with the accentuated syllable *-lan-* of the word *adelante* (“ahead”), she rapidly moves her right hand forward describing a flat parabola (loose B-handshape, palm toward down. Fig. 4F). The use of the word *tampoco* (“either,” negative) is quite telling. This term appears to be used here to complement the information of *not* having a neighbor living west of her (a negative case) to which she had referred to 10 s earlier. At that moment, she had adopted a canonical bodily orientation facing east (Fig. 4D). Now, complementing this previous (negative) information, she regains that canonical bodily orientation and adds that nobody lives on her eastern side *either* (see Fig. 3, location “N2”). Given this regained canonical body orientation, she points to this house east of her by indicating a position in front of her body.

In sum, through the analysis of linguistic expressions and co-speech gesture production, we observed that speakers of CA actively recruit the Spanish lexemes *adelante* (“ahead”)/*atrás* (“behind”), and *al frente* (“in front”)/*detrás* (“behind” positional), to characterize spatial relations. But, at least in this Chilean variety, there is a distinction that in standard Spanish does not exist: Although the latter pair of lexemes—*al frente/detrás*—is used according to the usual meaning in Spanish to characterize position relative to objects, the former pair—*adelante/atrás*—is used to describe spatial positions with respect to east/west absolute references. This use does not exist in Spanish. In CA, the Aymara-driven need to lexically encode the east/west orientation (substratum) is thus instantiated via the recruitment of existing lexemes in Spanish (superstratum) adapted for the specific purposes of this Amerindian distinction. The presence of the corresponding co-speech gesture production provides, once again, evidence of the cognitive psychological reality of this phenomenon.

#### 4.3. Metaphorical extensions of spatial patterns to expressions regarding time in CA

The peculiar use of the spatial terms *adelante/atrás* in CA is also manifested in metaphorical extensions to temporal construals. For instance, when answering the question of when the rainy season takes place, Aymara speakers of CA often respond *del 24 de diciembre o por delante* (literally “from December 24 or ahead,” meaning, at Christmas or earlier). Similar answers can be given to the question of when, for instance, is the arrival of the weekly regional bus: *como al mediodía o por delante* (“around noon or ahead,” meaning around noon or earlier). Such expressions are not grammatical formulations in standard Spanish, but in CA, they are completely normal and unambiguous. In terms of conceptual metaphor theory (Lakoff, 1993; Lakoff & Johnson, 1980), such expressions are instances of sequence time, the (up to now) universal Time-reference point (Time-RP) spatiotemporal metaphor where temporal events and times are conceived as spatial entities ordered in a sequence with their metaphorical “fronts” facing earlier times and their “backs” oriented toward later times (Núñez, Motz, & Teuscher, 2006; Núñez & Sweetser, 2006). Under this metaphorical mapping, “front” and “back” are specified relative to the metaphorical orientation of the times or temporal events themselves. This widely spread conceptual metaphor is the one that underlies English



expressions such as *the day before yesterday*, which refers to the closest day that holds the earlier-than relationship with yesterday and that it is metaphorically located at the *front* (fore) of the latter. Similarly, the *day after tomorrow* is the closest day that holds the later-than relationship with tomorrow, and it is located toward the *aft* (rear) end of the sequence, behind tomorrow. In Spanish, there are also expressions of this sort—*anteayer* or *antes de ayer* (“before yesterday”)—but in order to answer the above question regarding the arrival of the weekly regional bus, a Spanish speaker would say *a mediodía o un poco antes* (“at noon or a bit earlier”). That is, the speaker would use *antes*, but not *delante*, which in Spanish is exclusively spatial.<sup>7</sup>

The differentiated uses of *adelante* (“ahead”)/*atrás* (“behind”) and *al frente* (“in front”)/*detrás* (“behind”) positional) to characterize spatial relations in CA suggest that the metaphorical extension to temporal cases using *delante* (not acceptable in Spanish) rather than *ante* is not arbitrary. It reveals the nature of the spatiotemporal metaphorical mapping where times and event in times are construed as having canonical orientations that are consistent with the spatial construals analyzed in the previous sections. Thus, *adelante* (“ahead”) and *atrás* (“behind”), which in CA are used to describe spatial positions with respect to east/west absolute references, can be extended metaphorically for construing temporal relations such that times that are *delante* (“ahead”) of other times occur earlier than the latter in the same way that, for any given day, the sunrise (which spatially takes places in the east) occurs earlier than the sunset (which takes place at the west).

Interestingly, this spatiotemporal construal may help explaining the unusual Aymara metaphorical conception of time involving the speaker (Ego) as a reference point—Ego-RP (Núñez & Sweetser, 2006). Unlike Time-RP metaphors (sequence time), Ego-RP metaphors (deictic time, with Ego as a reference point) have a deictic center provided by the Ego whose location defines the moment Now and gives rise to the intrinsically deictic categories FUTURE and PAST. Whereas most languages and cultures around the world map the space in front of Ego onto times that have not occurred yet (i.e., future)—as in *she has her entire career in front of her*, and the space behind Ego with times that already occurred (i.e., past)—as in *he left his sad past behind*, Aymara operates with an Ego-RP metaphor that maps the past with the space in front of Ego, and the future with the space behind Ego. Núñez and Sweetser (2006) documented this unusual conceptual phenomenon with etymological and metaphorical analyses (especially involving the terms *nayra* and *qhipa* that serve to denote past and future, respectively), but, crucially, also with empirical observations of co-speech gesture production, which provided evidence of the psycho-cognitive reality of the underlying metaphorical mappings. As an initial explanation of the unusual Aymara Ego-RP spatiotemporal metaphor, Núñez and Sweetser suggested that one of the main factors structuring the inferential organization for such mapping was the importance of visual experience in Aymara, which is attested by the use of vision-based mandatory grammatical evidentials and the social practices they entail. According to Núñez and Sweetser, the relevance of visual experience in Aymara profiles what is in front of Ego as what is seen, and therefore known, and what is behind Ego as what is not seen and therefore, unknown. The Aymara Ego-RP mapping thus characterizes future (unknown times) as being behind Ego and past (known times) as being in front of Ego. Núñez and Sweetser



suggested that the relevance of visual experience was a necessary, but not sufficient, condition for the bodily orientation observed in the Aymara Ego-RP mapping, and they pointed out that the fact that the relevance of visual experience alone is not responsible for such mapping comes from the fact that there are other languages and cultures that operate with vision-based evidentials but do not exhibit the Past-is-in-front-of-Ego and Future-is-behind-Ego mapping (the causal or correlational nature of this phenomenon needs further investigation, and its analysis goes beyond the scope of this article). The present report adds an additional element to the understanding of what brings the unusual Aymara Ego-RP to being. Other than the relevance of visual experience as a source of knowledge, the present study shows that times and events in time can also be conceived as having the same metaphorical canonical orientations as humans and objects—“facing” East, where earlier times (e.g., sunrise) are in front of later times (e.g., sunset). Aymara speakers appear to be able to integrate the basic inferential structure of the common Time-RP mapping for sequence time (earlier is ahead, later is behind) with the inferential organization of their unusual vision-driven Ego-RP mapping for deictic time. The result is a metaphorical mapping that has an Ego that other than specifying the moment Now is also canonically oriented facing east, looking at (and knowing) times earlier than now (i.e., past) with its back toward (and not knowing) times later than now (i.e., future). This interpretation is consistent with recent cognitive linguistic analysis by Kevin Moore (2010), which building on a frame semantics approach (Fillmore, 1985), investigates temporal construals of time in Japanese, Wolof, and Aymara. Underlying the unusual Aymara Ego-RP metaphorical construal of time then seems to be the primacy of visual experience for knowledge gathering but also the canonical east–west orientation of entities that gets extended to temporal sequences.

#### 4.4. *Urban layout and the orientation of houses and buildings*

##### 4.4.1. *Eastward orientation of the houses*

Traditional Aymara towns show a rather uniform urban display, with their houses orderly positioned having their main entrances facing east, toward the location where the sunrise takes place (Fig. 5).

This eastward orientating pattern generates the rather peculiar situation in which, unlike most places in (at least) the Western world, houses do not face the front doors of the neighboring houses across the street. When going out of the main door of a house located along the western side of a street running north–south, a person sees the back of the house of the neighbor across the street. Fig. 6 shows this peculiar fact quite clearly.

The eastward orientation of houses in traditional Aymara towns is ubiquitous. Table 1 shows, for five towns of inland Iquique in Northern Chile, the number (frequency) of buildings—houses, churches, and official municipal buildings—whose main doors are facing east versus the number of those facing in the direction of any other cardinal point combined. In all five towns, the orientation of houses and buildings was significantly more likely to be eastward than any other orientation.<sup>8</sup> These highly statistically significant results provide empirical evidence for the primacy of eastward house orientation in traditional Aymara communities of Northern Chile.



Fig. 5. A typical Aymara town (Villablanca). Houses are oriented with their entrance toward the east, the location of the sunrise. The picture was taken in the late afternoon, facing southeast. No doors can be seen on the western side of the houses.

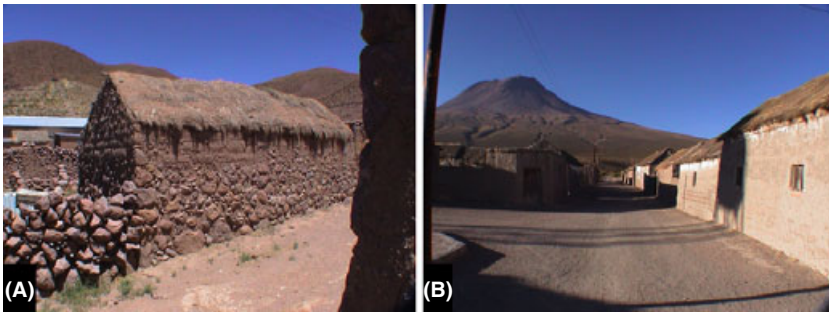


Fig. 6. A traditional house in Chijo (A). The picture was taken around noon, facing eastward. The house is oriented toward the location of sunrise (in this case, toward the top of the hill). The neighbor across the street on the western side (from where the picture is taken) only sees the back of this house, no doors or windows. Plate (B) shows a street in Villablanca. The picture was taken facing north in the late afternoon (with Mount *Wanapa* or *Cariquima*—5,390 mts—in the background). The houses on the right of the picture do not have direct access to the street as their front doors are located on their eastern sides.

#### 4.4.2. *The extreme case of Chijo*

The town of Chijo provides an excellent example of the primacy of the eastward orientation in the Aymara culture. Chijo is a very small town, located in the Chilean highlands, almost by the Bolivian border. It is a very old town, whose Aymara name means “shade.” This case is a highly interesting one, because, unlike many Aymara traditional towns in this area, which lie on the plateau, Chijo is located on the Western slope of a chain of mountains running north–south (see Fig. 7). The reason why this town was created at this location resides on the fact that the place has a natural source of water and a relatively mild microclimate generated by the local arrangement of the mountains that protect the area from

Table 1  
Orientation of houses and buildings of five Aymara towns in Northern Chile

	No. Houses Oriented Eastward	No. Houses Orientated South, North, or Westward	Total	$\chi^2$
<i>Chijo</i>	28 (54)	24 (46)	52 (100)	23,08
<i>Chulluncane</i>	33 (85)	6 (15)	39 (100)	73,92
<i>Enquelga</i>	101 (86)	16 (14)	117 (100)	234,67
<i>Isluga</i>	136 (64)	77 (36)	213 (100)	171,46
<i>Villablanca</i>	48 (89)	6 (11)	54 (100)	117,56

Note. All cases are statistically significant for  $\chi^2$  test, 1 *df*, ( $p < .00001$ ). The values in parentheses represent percentages.

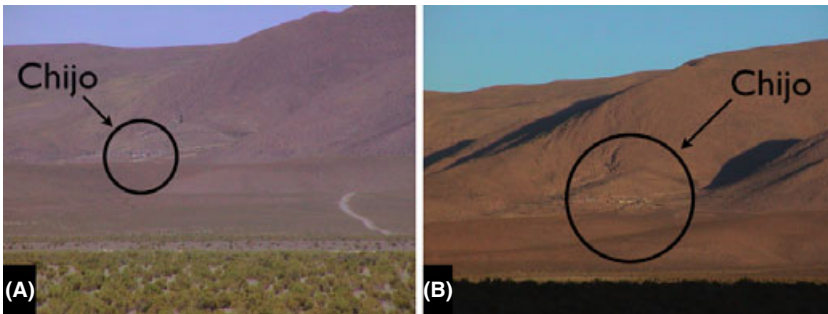


Fig. 7. Chijo and its geographical setting. The small town, slightly to the left of plate (A), is located on the western side of the mountain chan. On the right, there is the (only) road that goes to the town. The picture—oriented eastward—was taken from the main plateau in the afternoon. Plate (B) shows a closer view of Chijo’s geographical setting (this picture was taken facing east, close to the time of the sunset). Despite its name, which literally means “shade,” Chijo gets sunlight almost the entire day, with the exception of those few hours around the time of the sunrise.

strong cold winds. These factors—even if they only apply locally in a rather reduced area—provide optimal conditions for the development of small pockets of terrace farming.

Given Chijo’s local topography—inserted in the western slope of the mountain—one would expect most of the houses and buildings to be oriented toward the valley (westward in this case). Such orientation, common to many places with mountains around the world, is naturally privileged as it serves various purposes, such as defense, access to viewpoints, and the monitoring of the incoming roads or paths leading to the town from the valley. The only way to get to Chijo is, in fact, through a dirt road that comes from the valley going eastward up the mountain (see right side of Fig. 7A). In Chijo, however, the traditional houses are facing east, that is, toward the top of the hills, and therefore do not have any views of the valley, the horizon, or the sunset (Figs. 6A and 8). Indeed, most traditional houses in this town do not have any doors or windows facing west and therefore lack any view toward the valley.

Chijo reveals how deep is the sunrise-driven orientation in Aymara culture, as the construction of the houses overrules basic building principles observed around the world, which

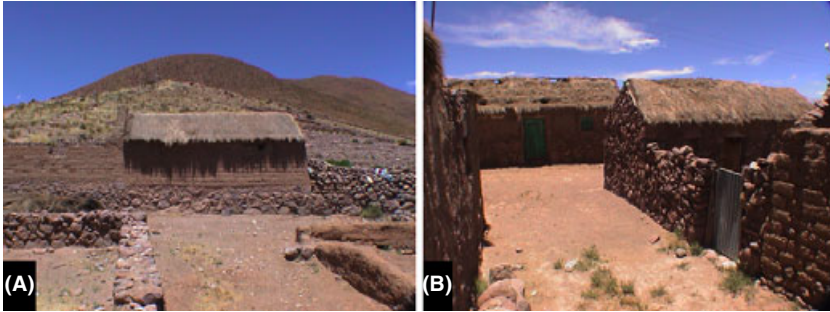


Fig. 8. Traditional houses in Chijo. Despite the town's position on a westward mountain slope, its houses are oriented toward the location of sunrise, namely, facing uphill toward the top of the mountain and with no direct view to the valley. Plate (A) shows a house with its back oriented toward the west. The house, facing directly uphill, has no doors or windows oriented toward the valley (picture taken around noon, facing eastward). Plate (B) shows traditional houses with their front doors facing the location of the sunrise, uphill (the picture was taken around noon, facing the west).

tend to put houses facing the valley. The primacy of the sunrise in Aymara orientation provides an answer to the question of why a town that gets sunlight almost all day long is paradoxically called “shade.” Chijo, in fact, is in the shade of the mountain during the early hours of the day, precisely when the sun is rising, already hitting the valley and the lower western lands. It is thus a metonymy motivated by the saliency of the sunrise that gives the name to this peculiar Aymara town.

The case of Chijo also illustrates an important cross-cultural contrast. As it can be seen in Table 1, not all buildings in Chijo are oriented toward the east. Interestingly, most of the buildings with noneastward orientation are relatively recent constructions corresponding to Hispanic and Chilean influences (many of them with roofs made of tin and other modern industrial materials [see white roofs in Fig. 9A]—with no traditional thatched roof [Fig. 8]). For instance, in Chijo, the school (Fig. 9B) and the social club—both built by the Chilean state, as well as the two churches (one Catholic and one Protestant) are buildings that, matching the usual western facing-the-valley pattern, violate the canonical orientation of traditional Aymara houses (Fig. 8).

## 5. Aymara land, space, and cosmology

As mentioned earlier, the east as cardinal direction has a privileged status in many cultures. In the Western world, the term *orientation* comes from the Latin *oriens*, the rising sun. Thus, “to be oriented” or guided is, etymologically, to be rightly positioned eastward. In the Aymara culture, the central role played by the sunrise as a symbolic reference point is well documented, framing socio-cultural, religious, and everyday activities (Llanque Chana, 1990; Van den Berg, 1992; Van Kessel, 1996a,b; Van Kessel & Enríquez Salas, 2002; Zapata Tarrés, 2001). According to these accounts, the east-to-west path described by the

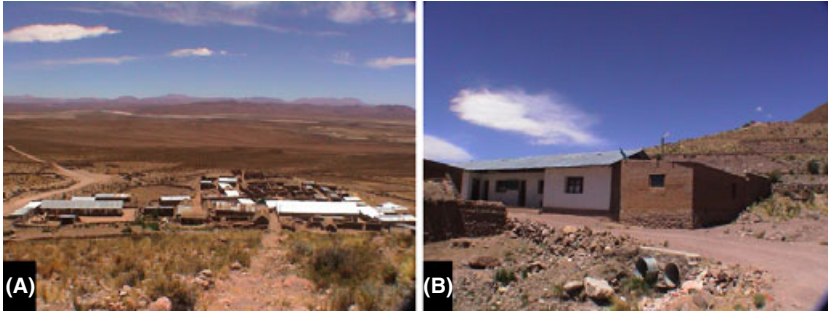


Fig. 9. Western influence in Chijo. Plate (A) shows Chijo from a higher location, with the valley in the background. A certain number of roofs made of tin (white roofs) can now be seen, corresponding to recent Hispanic and Chilean influences (the picture was taken around noon, facing west). On the left, there is the only road that goes to the town. Plate (B) shows the entrance to Chijo from the valley with the uphill slope in the background (the picture was taken around noon, facing northeast). On the left, there is the main entrance to the school, which facing westward (downhill) and constitutes an exception to the canonical orientation of Aymara houses. The school was built by the Chilean state.

sun throughout the day has shaped the community's rituals, customs, beliefs, and cosmology. This spatial orientation pattern, however, unlike the Western industrialized world, has not stayed exclusively at a discursive level, but rather, it has permeated many layers of cultural practices manifesting itself in ordinary physical cultural artifacts (Hutchins, 1995), and in specific everyday psycholinguistic and cognitive activities (Lakoff & Johnson, 1980). For instance, the *ayllu*, which is both a town with its land *and* the community of its inhabitants, appears to be conceived as having a canonical orientation toward the rising sun, presumably because such is the location from where light originates, and from where the rain arrives, nourishing animals, crops, medicinal plants, and all forms of life (Van Kessel, 1996b). Consequently, ordinary material artifacts such as people's houses (*uta*) and corrals for domestic animals are primarily built with the main (often the only) door or gate facing east. And, as we report in this study, this can be observed even in cases where strong topographical constraints call for obvious exceptions to the eastward house orientation rule (e.g., houses built on downward mountain slopes toward the west).

### 5.1. Symbolic space in customs and religion

Traditionally, Aymara spiritual practices have seen deities and powerful beings incarnated in concrete entities and objects of the surrounding ecology. The very idea of a transcendental or metaphysical deity was incorporated much later through Christianity during the Spanish conquest (Van Kessel, 1996a). Centuries of colonization have resulted in a blend of core ancient traditional beliefs with new foreign ones (Van Kessel, 1996b). Today, vernacular beliefs are referred to as *costumbres* ("customs"), whereas Western practices as *religión* ("religion"). *Customs* relate to the ecological processes involved in the activities of the community, which are strongly tied to the productive cycle of *Pachamama*—Mother Earth. This stands in sharp contrast with the beliefs and values imposed by Catholic and



Protestant *religions*, which, invoking a transcendental dimension, inherently separate people and physical entities from the environment in which they exist. Like other Amerindian groups that have forms of animism and ways for rendering animated what is not animated (Viveiros de Castro, 2002), Aymara beliefs manifest in the sacredness of nature and in the incorporation of human existence into such nature. The sacredness of nature is expressed through animism in the form of rivers, mountains, and animals. For example, Aymara people perform rituals and ordinary cults to *Pachamama* through offerings involving special arrangements of coca leaves and maize at their homes. *Pachamama*, however, not only feeds and sustains life, humans also belong to her. Humans are *part* of *Pachamama* herself.

The relevant symbolic space where *customs* take place is the *Akapacha* (“our world/epoch”). *Pacha* is the Aymara word for time and space. Its core physical locus is the concrete world in which the Aymara community lives in the Andes highlands. *Akapacha* means “this world and epoch” (*aka*: here, this), that is, the material world in which Aymara people live at this multigenerational time. This space/time consists of physical objects and the spirits that inhabit in mountains, rivers, and meteorological phenomena. *Customs* include rituals conceived to honor aspects of the *akapacha*, which are embodied in three kinds of spirits: (a) *achachilas* (ancestors) or *mallkus* (mister, distinguished man), which are the spirits of the mountains around the *ayllu* (town); (b) *Pachamama*, who regularly receives presents and sacrifices, and to whom a special day is dedicated for celebrating the fertility of the soil and the birth of the new animals; and (c) *amaru* (‘serpent’), the spirit of the rivers and waters that receives cult in the lower agricultural areas downhill from the highland plateau. The *Akapacha* has therefore three levels: *achachilas* and *mallkus* (up); *pachamama* (the ground level at which the *ayllu* is situated); and *amaru* (down). In the Aymara culture, this tripartite space is spiritual and material at the same time and characterizes the order of the life cycle: from the snowed mountain tops, where rain and rivers originate, through the highlands plateau, where the nourishing grass grows sustaining life, to the lands downhill from the plateau, which follow the water course taking away fallen objects that are no longer needed. Crucially, the structure of the *Akapacha* reveals the cosmological relevance of the orientation toward the east getting reproduced in the urban layouts of Aymara villages (*ayllu*) (Van Kessel, 1996b): The *ayllu* as a whole is typically oriented toward the east, so that the entire town is permanently “looking” at the mountains where life and sunlight originate. At the rear part of the town (i.e., its western part), one finds the square (*plaza*), the church (*Iglesia t’alla*, “Mrs. Church”), and its tower (*Torre mallku*, “Mr. Tower”). And behind the church (i.e., further west) is the cemetery. This urban layout is systematic, and it reflects precisely the tripartite life course characterized by the east-to-west oriented *Akapacha*. The encompassing totality of the community and its environment—not just the physical individuals—is conceived then as having a well-defined canonical orientation: facing the sunrise.

## 5.2. *Marka and Ayllu: The orientation of territories and towns*

The highlands plateau of the Andes was and still is the center of the symbolic space in which the Aymara community dwells. In the Chilean territory, the Aymara community has



gone under substantial process of acculturation as the community assimilates to the Chilean society. Less acculturated Aymara people in Chile are still living in the highlands region, dispersed in many small towns—the *ayllus*. Despite the apparent dispersion of the Aymara people, the community constitutes a whole geographical and cultural unit, the *marka*. The *marka* is the geographical territory where a specific Aymara group develops its commercial, social, and religious exchanges. This geographical unit has been described as an “archipelago” of *ayllus* that are economically and culturally tied (Van Kessel, 1996a), constituting a unity despite the lack of clear political and physical demarcations. The identity of a *marka* can be characterized through the following: (a) the recognition of a central town as a cultural, social, and political capital; (b) the set of constituting *ayllus* that participate in common religious festivities and collaborative works; and (c) by a specific dialectal variation of the Aymara language. Even though the foreign administrations—Incaic (ca. 1470), Spanish (1600–1650), and Chilean (since 1879)—dramatically transformed the structural unity of the original *marka*, this ancestral organization can still be observed in many cultural manifestations and material artifacts. Three Aymara *marka* can be distinguished nowadays in Northern Chile: one around the Cariquima area; one around Isluga; and one around the Parinacota area (Van Kessel, 1996b).

The notion of *marka* is polysemous from a Western viewpoint. A *marka* designates at the same time an Aymara ethnic group and the geographical space in which this group lives. Moreover, a *marka* also refers to a specific town in which daily life takes place, but it also refers to the central town that defines a broader symbolic network of geographically connected towns. In Northern Chile, the *marka* town of Cariquima, for example, serves as the capital of a more extensive *marka* area that includes, among others, the towns of Chulluncane, Villablanca, and Chijo. Geographically, along the north–south axis, the *marka* town is situated exactly in the middle of the *marka* area, but, along the east–west axis, it is usually located to the east of the middle point of the total area. This asymmetry along the meridian axis appears to be a geopolitical manifestation of the cultural relevance of the east: Important sites and constructions are not only facing east but also located on the Eastern part of a certain area. Consequently, the *marka* town Cariquima is situated at the east (*nayra*, front) of the complete corresponding *marka* territory.

Being at once symbolic and geographic, the Aymara concepts of *marka* and *ayllu* make no clear-cut distinction between artificial and natural worlds (Albó, 1988; Hardman, 1981; Van den Berg, 1992; Van Kessel, 1996a,b). Animals, houses, plants, and mountains are also part of what constitutes the *ayllu* and the *marka*. Further, the Aymara concept of “town” does not make a sharp distinction between artifacts created by human and objects in the natural world, but rather the concept denotes an ecological totality where humanity and nature are not separated in a fundamental way. In this sense, it is not what humans do or create that defines whether something is part of the *ayllu*; it is its being an inherent part of the landscape. The “town” Aymara people live in is not primarily a product of human activity, but rather it is a living part of the *Pachamama* (“mother earth”), to whom we all—humans, animals, and landscape—belong. According to the Aymara mythology, *Pachamama* gave birth to the *ayllu* and the *marka*. Because of the very fact that humans are offspring of *Pachamama*, they are constitutive of this totality. Crucially, for the purposes of this article,

the Aymara notions of territory (*marka*) and town (*ayllu*) are conceived as living totalities, spiritually and materially intertwined with their environment, which, encompassing both people and land, are susceptible to having a canonical bodily orientation like human bodies do—facing the sunrise.

## 6. General discussion

The traditional Aymara culture exhibits a special case of the use of absolute spatial FoR for denoting the relative position of physical objects. Although it is not unusual to see in other cultures a preference for using absolute FoR for characterizing spatial locations—usually by explicitly specifying cardinal directions or some salient feature of the natural environment—in Aymara the linguistic east–west absolute FoR is implemented via lexemes that refer to intrinsic body-based features—*nayra* (“eye, front”) and *qhipa* (“back, behind”). This linguistic intrinsic-for-absolute encoding is done despite the availability of absolute (cardinal) sun-based lexemes—*inti-jalsu* (sur-rise) and *inti-jalanta* (sun-set). Irrespective of where the front side of a person is, anything located to the east of her can be described as being *nayra*; similarly, everything located westward can be described as *qhipa*. This pattern is not a mere fossilized linguistic fact as the term “orientation” is today in the Western world, as it is manifested also multimodally in real-time motoric action via speech–gesture co-production. This observation, in line with other ethnographic studies, demonstrates the necessity of studying co-speech gesture where FoR are concerned (Le Guen, 2011; Núñez, Cooperrider, Doan, & Wassmann, unpublished data).

Further, Aymara speakers when speaking CA clearly distinguish the Spanish pair *adelante/atrás* (“ahead/behind”)—taken to mean eastward/westward, from *frente/detrás* (“front/behind something”). Under this form, the distinction does not exist in standard Spanish. Although, while in Spanish, *adelante/atrás* emphasize orientation, projection, and potential motion (like “ahead” in English), *frente/detrás* emphasize position. But in Spanish both sets of lexemes refer to intrinsic properties of the body, namely, its front and back asymmetries. CA, however, while leaving the pair *frente/detrás* essentially for the same purposes as in Spanish, recruits the pair *adelante/atrás* for fulfilling a specific Aymara need: the denotation of the east–west absolute FoR. This peculiar adaptation of Spanish lexemes seems to be a consequence of the clash generated by the traditional Aymara spatial references—with its need for the absolute referencing of the east—and the Spanish language, which only has the *intrinsic* uses of these terms. What is more, this CA distinction is extended to metaphorical construals of temporal relations such that times that are *delante* (“ahead”) other times occur earlier than the latter. This is consistent with the fact that, for any given day, the sunrise, which spatially takes places in the east, occurs earlier than the sunset, which takes place at the west.

Is it possible to give an account—with a single encompassing explanatory proposal—of the two linguistic facts that (1) the Aymara language uses the intrinsic terms *front* and *back* to describe the *absolute* references east and west, and that (2) CA, unlike Spanish, uses the peculiar distinction *adelante/atrás* (with the corresponding metaphorical temporal

extensions) for the same purpose? This ethnographic study shows that, beyond purely linguistic distinctions, specific macro-cultural symbolic elements in the Aymara culture—the primacy of the sunrise and the canonical orientation of the primordial human-nature community—provide an answer to both questions at once. A broad macro-cultural worldview thus underlies both linguistic facts, (1) and (2).

The three main FoR—relative, intrinsic, and absolute—have been characterized as being coordinate systems used to localize a Figure (referent) with respect to a Ground (Levinson, 2003). Whereas the relative FoR uses a ternary relationship where Figure and Ground are specified with respect to the speaker’s viewpoint, intrinsic and absolute FoR share the structural property that both use Figure–Ground binary relationships and are viewer-independent. Intrinsic and absolute FoR share the fact that the origo of their corresponding coordinate systems is specified by the Ground, but they differ with respect to the nature of the coordinates—defined by the object-Ground itself for the former and by external environmental features for the latter. Formally speaking, therefore, intrinsic and absolute FoR share substantial structure, which facilitates the encoding of an absolute FoR in intrinsic terms. What is needed for that to be accomplished universally and unambiguously is a robust, stable rule that specifies that all Ground-objects are oriented equally, such that the ensemble of object-Ground-based inferences is extensionally equivalent to the extrinsic-environment-based inferences. This is precisely what happens in the Aymara language, where following Aymara cosmology, people, objects, and land are canonically oriented toward the east. The Aymara worldview then, meeting the demands of the underlying formal properties involved in intrinsic and absolute FoR, provide the necessary conditions for the lexemes “front” and “back” to unambiguously denote “east” and “west,” respectively.

Why is the east such a paramount cardinal direction? Anthropological studies of Aymara cosmology have pointed to the crucial importance of the moment and location of sunrise in Aymara beliefs. Ceremonies and patron saint festivities are organized precisely when the sunrise takes place at the patron saint’s day in the Catholic calendar. At the summits where the ancestors reside (*achachilas*), the communities carry out their offerings and sacrifices in order to maintain the ecological–supernatural balance of which they are part of. The rising of the sun, and the beginning of the day, seem to represent the origin of life. It is from the east that comes the initial light that brings the day into being, sustaining life and spreading warmth during the cold mountainous mornings, as well as the rain that feeds animals and vegetation in the arid and windy plateau of the highlands. At the same time, the Aymara cosmology sees (a) human nature as a constitutive element of *Pachamama*, that is, the community of humans as inseparable from nature; and (b) the human being not as an isolated individual entity but rather as a part of a wider community. The Aymara cosmology thus brings meaning and depth to the existence of human beings, by inserting humanity as constituent parts of *Pachamama*. That is, by seeing Mother Earth at once natural and supernatural, natural, and human. The lexical item *nayra*—literally “front”—thus denotes not just the front of an individual but the front of the *marka*, the territory, and of the *ayllu*, the entire community with its land. The term designates the front of the town as a whole—the people and the physical niche in which they exist. As the community and its

land are always oriented toward the direction from where life comes—the fundamental sources of sunlight and rain—*nayra* thus reflects the canonical orientation toward the east. Inversely, *qhipa* is not just behind the individual but behind the community and its land as a whole. This macro-cultural construal underlying the canonical orientation in Aymara gets even clearer when it is materialized in the form of the actual physical orientation of houses and urban organization. Interestingly, this materialization acts as an efficient form of cognitive off-load. When dealing with moment-to-moment absolute spatial orientation demands, Aymara people can rely on their built environment. Indeed, in order to reduce attention and memory loads, the environment is made to hold relevant information that can be recruited when needed, on a need-to-know basis (Wilson, 2002). At any given moment, the constructed environment (e.g., oriented houses) signals the orientation of east. Thus, the physical layout of towns and houses serves as an ongoing spatial-orienting material anchor (Hutchins, 1995, 2005). From this perspective, the suggestion “that spatial language and nonlinguistic preferences and competences in spatial cognition are systematically aligned across human populations” (Haun et al., 2011, p. 70) may be (at least partially) explained by the fact that both spatial language and nonlinguistic preferences and competences are co-affected by broader and ubiquitous nonlinguistic cultural practices and material anchors. Some form of the Whorfian claim may be right—that at least in the spatial domain language structure does seem to affect cognition, but the findings of this study suggest that much of this influence is due to broader macro-cultural factors that affect both language structure *and* cognition.

## 7. Conclusion

The ethnographic data presented here show, with different but complementary methods, that the linguistic patterns of object-centered body-based lexicalization of absolute spatial FoR in Aymara are profoundly rooted in a broader worldview shared by the speakers of this language. This worldview perceives the human community as part of Nature itself, the totality of which is canonically oriented toward the location of the sunrise. The resulting intrinsic-for-absolute encoding, perhaps facilitated by the formal Figure/Ground binary properties shared by intrinsic and absolute FoR, is neither a purely linguistic fact nor a rationalized description, as it manifests multimodally in co-speech gesture and in urban layouts. The Aymara construal seems to explain why the absolute (cardinal) FoR for comparing relative positions is not just directly encoded via the existing absolute terms *inti-jalsu* (sun-rise) and *inti-jalanta* (sun-set). Doing so would indeed characterize an absolute space, but it would portray an empty meaningless land, deprived of its constitutive humanity. Rather, the lexemes *nayra* (“front”) and *qhipa* (“behind”) are recruited for encoding the absolute cardinal directions east and west, brought forth by a conception of space with a built-in human community-Nature whole facing the sunrise. The expression of Aymara worldviews in language, gesture, everyday activities, and urban organization shows, in a fundamental way, how culture dwells in our bodies.

## Notes

1. CA is a generic term referring to variations of Spanish (Castilian) in the Andean region as a whole, especially in relation to Quechua and Aymara (Cerrón Palomino, 2003). Here, we specifically refer to a Spanish-Aymara variation, sometimes called “Castellano Aymarizado” (Salas, 1996).
2. Nowadays, the Chilean school system—obligatory until eighth grade—is very well established, and it operates mostly with Spanish monolingual teachers who come from other regions of the country. Younger generations primarily see Spanish as a language of progress, education, and opportunities, and as a result, Aymara is no longer spoken at home on a regular basis. These days, children who speak Aymara fluently are extremely rare in northern Chile.
3. In the town of Cariquima, we only took pictures. For logistic reasons, we excluded this town from our statistical analysis.
4. *Nayra* is pronounced *layra* in the dialectal variation spoken in this region.
5. Alto Hospicio is located near the port of Iquique, at approximately 240 km away. Many Aymara people have emigrated there looking for job opportunities.
6. The real name has been replaced.
7. Other Spanish morphological derivations for temporal terms, however, such as *adelantado* (“in advance”) or *atrasado* (“delayed”), which use the morphemes *ante* and *tras*, respectively, are common in Spanish and they are, overall, consistent with the uses in CA.
8. This is based on the assumption that if houses were oriented randomly, the probability of finding a house oriented toward the east is 0.25 (i.e., east vs. north, west, south, combined).

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## References

- Albó, X. (Ed.) (1988). *Raíces de América: El mundo Aymara*. Madrid, Spain: Alianza Editorial.
- Bates, E., & Dick, F. (2002). Language, gesture, and the developing brain. *Developmental Psychobiology*, 40, 293–310.

- Bertonio, L. (1984). *Vocabulario de la lengua Aymara*. Cochabamba, Bolivia: Ediciones CERES. [Original work published 1612].
- Briggs, L. T. (1993). *El idioma Aymara: Variantes regionales y sociales*. La Paz, Bolivia: Ediciones ILCA.
- Brown, C. H. (1983). Where do cardinal direction terms come from? *Anthropological Linguistics*, 25, 121–161.
- Cerrón Palomino, R. (1982). El problema de la relación Quechua-Aru: El estado actual. *Lexis*, 6, 213–242.
- Cerrón Palomino, R. (2003). *Castellano Andino: Aspectos sociolingüísticos, pedagógicos y gramaticales*. Lima, Peru: PUCP.
- Cienki, A. (1998). Metaphoric gestures and some of their relations to verbal metaphoric expressions. In J.-P. Koenig (Ed.), *Discourse and cognition* (pp. 189–204). Stanford, CA: CSLI Publications.
- Cienki, A., & Müller, C. (Eds.) (2008). *Metaphor and gesture*. Amsterdam: John Benjamins.
- Cornejo, C., Simonetti, F., Ibáñez, A., Aldunate, N., Ceric, F., López, V., & Núñez, R. (2009). Gesture and metaphor comprehension: Electrophysiological evidence of cross-modal coordination by audiovisual stimulation. *Brain and Cognition*, 70, 42–52.
- Dasen, P., & Mishra, R. (2010). *Development of geocentric language and cognition: An eco-cultural perspective*. Cambridge UK: Cambridge University Press.
- Fillmore, C. (1985). Frames and the semantics of understanding. *Quaderni di Semantica*, 6, 222–254.
- Gallego, S. (1994). *K'isimira: Gramática viva de la lengua Aymara*. La Paz, Bolivia: Bruño-hisbol.
- Goldin-Meadow, S. (2003). *Hearing gesture: How our hands help us think*. Cambridge, MA: Belknap.
- Grebe, M. E. (1986). Migración, identidad y cultura Aymara: Puntos de vista del actor. *Revista Chungará*, 16–17, 205–223.
- Grebe, M. E. (1990). Concepción del tiempo en la cultura Aymara: Representaciones icónicas, cognición y simbolismo. *Revista Chilena de Antropología*, 9, 63–81.
- Hardman, M. (Ed.) (1981). *The Aymara language in its social and cultural context*. Gainesville, FL: University Presses of Florida.
- Hardman, M. (1988). Jaqi Aru: la lengua humana. In X. Albó (Ed.), *Raiçes de América: El mundo Aymara* (pp. 155–205). Madrid, Spain: Alianza Editorial.
- Hardman, M., Vásquez, J., & Yapita, J. D. (1988). *Aymara: Compendio de estructura fonológica y gramatical*. La Paz, Bolivia: Ediciones ILCA.
- Haun, D., Rapold, C., Janzen, G., & Levinson, S. (2011). Plasticity of human spatial cognition: Spatial language and cognition covary across cultures. *Cognition*, 119, 70–80.
- Haviland, J. B. (1993). Anchoring, iconicity and orientation in Guugu Ymathirr pointing gestures. *Journal of Linguistic Anthropology*, 3, 3–45.
- Hutchins, E. (1995). *Cognition in the wild*. Cambridge, MA: MIT Press.
- Hutchins, E. (2005). Material anchors for conceptual blending. *Journal of Pragmatics*, 37, 1555–1577.
- INE (Instituto Nacional de Estadísticas) (2008). *Población y Sociedad: Aspectos demográficos*. Santiago, Chile: Instituto Nacional de Estadísticas.
- Iverson, J., & Thelen, E. (1999). Hand, mouth, and brain: The dynamic emergence of speech and gesture. In R. Núñez & W. Freeman (Eds.), *Reclaiming cognition: The primacy of action, intention, and emotion* (pp. 19–40). Thorverton, UK: Imprint Academic.
- Kendon, A. (2000). Language and gesture: Unity or duality? In D. McNeill (Ed.), *Language and gesture* (pp. 47–63). Cambridge, UK: Cambridge University Press.
- Köster, G. (1992). Los Aymaras: Características demográficas de un grupo étnico indígena antiguo en los Andes centrales. In H. Van den Berg & N. Schiffers (Eds.), *La cosmovisión Aymara* (pp. 81–111). La Paz, Bolivia: UCB/Hisbol.
- Lakoff, G. (1993). The contemporary theory of metaphor. In M. Ortony (Ed.), *Metaphor and thought* (2nd ed., pp. 202–251). Cambridge, UK: Cambridge University Press.
- Lakoff, G., & Johnson, M. (1980). *Metaphors we live by*. Chicago: University of Chicago Press.
- Layne Pairumani, F. (1992). El idioma Aymara. In H. Van den Berg & N. Schiffers (Eds.), *La cosmovisión Aymara* (pp. 113–142). La Paz, Bolivia: UCB/Hisbol.



- Le Guen, O. (2011). Speech and gesture in spatial language and cognition among the Yucatec Mayas. *Cognitive Science*, 35, 905–938.
- Levinson, S. (1996a). Language and space. *Annual Review of Anthropology*, 25, 353–382.
- Levinson, S. (1996b). Relativity in spatial conception and description. In J. Gumperz & S. Levinson (Eds.), *Rethinking linguistic relativity* (pp. 177–202). Cambridge, UK: Cambridge University Press.
- Levinson, S. (2003). *Space in language and cognition: Explorations in cognitive diversity*. Cambridge, UK: Cambridge University Press.
- Levinson, S., & Wilkins, D. (2006). *Grammars of space: Explorations in cognitive diversity*. Cambridge, UK: Cambridge University Press.
- Llanque Chana, D. (1990). *La cultura Aymara: Desestructuración o afirmación de identidad*. Lima, Perú: Idea/Tarea.
- Majid, A., Bowerman, M., Kita, S., Haun, D., & Levinson, S. (2004). Can language restructure cognition? The case of space. *Trends in Cognitive Sciences*, 8, 108–114.
- McNeill, D. (1992). *Hand and mind*. Chicago: University of Chicago Press.
- McNeill, D. (Ed.) (2000). *Language and gesture*. Cambridge, UK: Cambridge University Press.
- McNeill, D. (2005). *Gesture and thought*. Chicago: University of Chicago Press.
- Miracle, A., & Yapita, J. D. (1981). Time and space in Aymara. In M. J. Hardman (Ed.), *The Aymara language in its social and cultural context* (pp. 33–56). Gainesville, FL: University Presses of Florida.
- Moore, K. (2010). Ego-perspective and field-based frames of reference: Temporal meanings of FRONT in Japanese, Wolof, and Aymara. *Journal of Pragmatics*, 43, 759–776.
- Núñez, R. (2006). Do real numbers really move? Language, thought, and gesture: The embodied cognitive foundations of mathematics. In R. Hersh (Ed.), *18 Unconventional essays on the nature of mathematics* (pp. 160–181). New York: Springer.
- Núñez, R., Motz, B., & Teuscher, U. (2006). Time after time: The psychological reality of the Ego- and Time-Reference-Point distinction in metaphorical construals of time. *Metaphor and Symbol*, 21, 133–146.
- Núñez, R., & Sweetser, E. (2006). With the future behind them: Convergent evidence from Aymara language and gesture in the crosslinguistic comparison of spatial construals of time. *Cognitive Science*, 30, 401–450.
- Salas, A. (1996). Lenguas indígenas de Chile. In J. Hidalgo, F. Schiappacasse, H. Niemeyer, C. Aldunate & P. Mege (Eds.), *Etnografía: Sociedades indígenas contemporáneas y su ideología* (pp. 257–295). Santiago, Chile: Editorial Andrés Bello.
- Tarifa, E. (1969). *Suma lajjra Aymara parlaña: Gramática de la lengua Aymara*. La Paz, Bolivia: Don Bosco.
- Van den Berg, H. (1992). Religión Aymara. In H. van den Berg & N. Schiffers (Eds.), *La cosmovisión Aymara* (pp. 291–308). La Paz, Bolivia: UCB/Hisbol.
- Van Kessel, J. (1996a). La cosmovisión aymara. In J. Hidalgo, F. Schiappacasse, H. Niemeyer, C. Aldunate & P. Mege (Eds.), *Etnografía: Sociedades indígenas contemporáneas y su ideología* (pp. 169–187). Santiago, Chile: Editorial Andrés Bello.
- Van Kessel, J. (1996b). Los Aymaras contemporáneos de Chile. In J. Hidalgo, F. Schiappacasse, H. Niemeyer, C. Aldunate & P. Mege (Eds.), *Etnografía: Sociedades indígenas contemporáneas y su ideología* (pp. 47–67). Santiago, Chile: Editorial Andrés Bello.
- Van Kessel, J., & Enríquez Salas, P. (2002). *Señas y señaleros de la Madre Tierra: Agronomía Andina*. Iquique, Chile: Abya-Yala/IECTA.
- Viveiros de Castro, E. (2002). *A inconstância da alma selvagem—e outros ensaios de antropologia*. São Paulo, Brazil: Cosac & Naify.
- Wassmann, J., & Dasen, P. (1998). Balinese spatial orientation: Some empirical evidence of moderate linguistic relativity. *The Journal of the Royal Anthropological Institute*, 4, 689–711.
- Whorf, B. L. (1956). *Language, thought, and reality*. New York: John Wiley.
- Wilson, M. (2002). Six views of embodied cognition. *Psychonomic Bulletin & Review*, 9, 625–636.
- Zapata Tarrés, C. (2001). *Las voces del desierto: Identidad Aymara en el Norte de Chile*. Santiago, Chile: RIL Editores.