Conceptual Abstraction and the Embodied Mind:
The empirical study of spatial construals of time

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… at my hotel room in Tokyo …

2 目覚まし時刻を見ながら、
   ▲ UP（進む） ▼ DOWN（戻る）ボタンを押して時刻を合わせる。
   （AM（午前）とPM（午後）を間違いなで下さい。）

   Please "TIME ADJUST" buttons to set alarm time.
   UP………Forward Time
   DOWN……Backward Time

① アラームスイッチを（OFF）にする。（赤色ランプ消灯）
   Turn alarm switch "OFF".

② 目覚まし時刻を見ながら、
   ▲ UP（進む） ▼ DOWN（戻る）ボタンを押して時刻を合わせる。
   （AM（午前）とPM（午後）を間違いなで下さい。）

   Please "TIME ADJUST" buttons to set alarm time.
   UP………Forward Time
   DOWN……Backward Time

③ アラームスイッチを（ON）にする。（赤色ランプ点灯）
   目覚まし時刻表示の上に "(on)" が表示され、セット完了です。
   Turn alarm switch "ON".
   The "(on)" sign will appear and the alarm lamp will shine red.

2 目覚ましアラーム鳴り止め

   アラームスイッチを（OFF）にする。
   赤色ランプ及び "(on)" 表示が消え、音が止まります。
   Turn alarm switch "OFF", "(on)" and lamp will disappear.

NOTE: If the time display is incorrect, please contact the front desk.
... some episodes in Homo Sapiens’ life ...
1. Everyday abstraction: Spatial construals of Time
   - Need of new classification systems: Ego- & Time-RP
2. Aymara: challenging some universals
   - Convergent evidence: lexical-metaphorical-gestural
3. The psychological reality of Time-RP: Priming Experiments
4. Exploring neural basis: an fMRI study (in progress)
5. Conclusions
1. Everyday abstraction: Spatial construals of Time
   - Types of construals: Ego- & Time-RP
2. Aymara: challenging some universals
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Spatial construals of Time

- Cognitive Linguistics
  - Waaaay *back* in the 50s …
  - The week *ahead* of us …
  - We are *coming* to the end of the quarter …
  - It is 20 minutes *ahead* of 1 o’clock
  - Halloween is almost *here*
  - Spring *follows* winter …

- … (and illustrations)
Spatial construals of Time

IMPULSO
PARA O
FUTURO

O ensino de nível médio prepara o jovem para os desafios do mundo do trabalho e o exercício da cidadania.
Two main conceptual metaphors (Criterion: **What moves?**)

1. **“Ego-moving”**
   - *We’re coming to the end of the year*

2. **“Time-moving”**
   - *Thanksgiving is approaching*
1.- Ego-moving Mapping

Source Domain
1-D Space

- front of ego
- behind ego
- ego’s location
- ego’s motion

Target Domain
Time

- future
- past
- present/now
- passing of time
2.- Time-moving Mapping

Source Domain
1-D Space

- front of ego
- behind ego
- ego’s location
- motion of objects

Target Domain
Time

- future
- past
- present/now
- passing of time
Moving-Ego, Moving-Time
Too simplistic?

- *The class meetings are too close together*
  - [no motion]

- *It is 20 minutes ahead of 1pm*
  - [Ego is not the RP]

- *Spring follows Winter*
  - [no Ego, no “Now”, no present]
“Ahead”? 

1. “Ego-moving”
   - *The week* ahead *of us*

2. “Time-moving”
   - *It is 20 minutes* ahead *of 1pm*
But *ahead* OF WHAT?

- Reference Point! (not motion per se)

1. “Ego-RP”
   - *The week* *ahead* of *US* (LATER)

   - *It is 20 minutes* *ahead* of *1PM* (EARLIER)
Time-RP Mapping

Source Domain
1-D (Ego-free) Space

- front of object
- behind object
- (some object)

Target Domain
Time

- earlier (than Now)
- later (present/now)

Moore, 1999
Núñez, 1999
Núñez & Sweetser, 2006
Examples of Time-RP

- Spring follows winter
- Before/After 1945
- PAST mapped with FRONT (relative to object)
  - The day before yesterday
  - \textit{Avant}-hier
  - \textit{Antes} de ayer

- FUTURE mapped with BACK (relative to object)
  - Con \textit{posterior}idad a 1950
“The day before yesterday”
FRONT mapped with PAST (relative to object)

“Con posterioridad a 1950”
BACK mapped with FUTURE (relative to object)
A new taxonomy
Criterion: Reference Point

Núñez & Sweetser, 2006
Núñez, Motz, & Teuscher, 2006
Summary: Spatial Construals of Time

- An essential construal of chronological experience (time) is built through a fundamental conceptual metaphor:
  - Time AS Unidimensional Space
  - Its general form is universal: construals are indeed Spatial

- It has (at least) two forms
  - 1.- Ego-RP (front/future – back/past)
  - 2.- Time-RP (front/earlier – back/later)

- Inferences ("truth") are relative to the mappings
Contents

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Aymaras
Where do Aymaras live?
South American Andes

Highlands
Aymara: Expressions regarding the past

**ancha nayra pachana**

Morpheme by morpheme gloss:
- *ancha*: a lot
- *nayra*: eye, sight, front
- *pacha*: time
- *-na*: in, on, at

Literal translation:
A lot eye/front time-at

Meaning:
(At a) long time ago
**Aymara: Expressions regarding the future**

**akata q”iparu**

Morpheme by morpheme gloss:

- *aka*: here, this
- *-ta*: from
- *q”ipa*: back, behind
- *-ru*: to, towards

**Literal translation:**

Here/this-from back-to

**Meaning:**

From now on
Spatial construals of time in Aymara
The crucial question

- Lexical and metaphorical evidence of
  - Time AS Unidimensional Space metaphor
- But …

In Aymara, is the underlying mapping Ego-RP or Time-RP?
Spatial construals of time in Aymara

The crucial question

- If the mapping is **Time-RP** then it simply operates like our "ahead" (front/Earlier – back/Later)
  - Many “exotic” languages thought to be counter-universal turned out to be like English, after the Time-RP distinction (Moore, 1999; Núñez & Sweetser, 2006).

- If the mapping is indeed **Ego-RP** then Aymara would be a counterexample to the universality of Ego orientation!
Spatial construals of time in Aymara
How to decide?

- Because of grammatical constraints in Aymara there is no way to answer to the previous questions with purely linguistic evidence (e.g., grammatical, lexical, …) (Hardmann, 2001)
- There are no clear and unambiguous cases such as
  - “The week ahead of us” (meaning future in front of EGO rather than of another time)

Spontaneous gestures?
What can we learn from Gestures?

- A detailed study of Gestures can help answering the previous questions
  - Gesture-speech co-production is universal
  - Astonishingly close speech-gesture co-production
  - Provide rich information about deixis, manner, and RPs (often complementary to speech)
  - Preservation and construction of semantics (iconics and metaphorical gestures): built-in
... más allá antes ...
“From last year to this year”

[From last year …]

Del año pasado …
“From last year to this year”

[... to this year]

... a este año
And much more …

Nayra mara … antiguo  
[old]

Aka maran  
[this year]

Q”uipa timpun  
[Future times]
And much more …

Last year’s  nayra sata  taypi sata  q”ipa sata
Micro movements … with transitive relations (order)
Time As Unidimensional Space: Aymara Ego-RP mapping

Source Domain
1-D Space

Target Domain
Time

Converging lexical, metaphorical, AND gestural evidence
Saggital Past gestures

Aymara participants producing sagittal past gestures
(n=15)

Language Proficiency

Fisher’s, $p = 0.035$

Núñez & Sweetser, 2006