

# Patterns and metaphors. A study of metaphorical patterns in the Verbario database of Spanish verbs

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# Outline

- Synthesis of the project
- (Short) theoretical background
- Metaphors in Verbario
- Methods for computer generation of CPA patterns
- Methods for computer metaphor identification and interpretation
- Provisional conclusions
- Words for Patrick

# Synthesis of the project

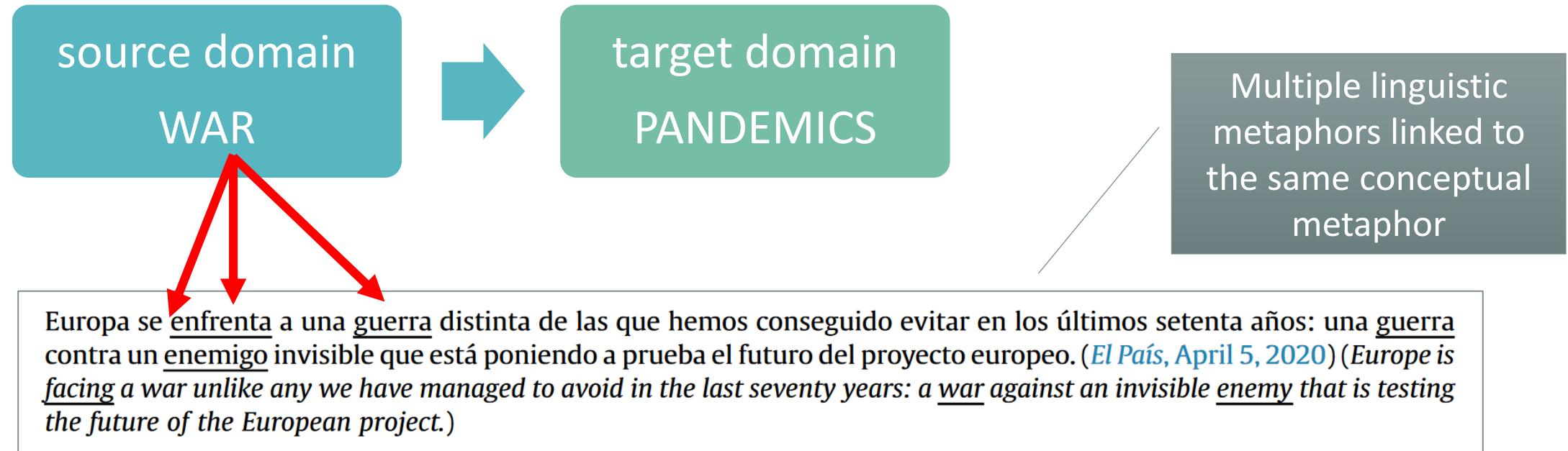
- Project devoted to find recurrent metaphors in Spanish verbs and nouns (Fondecyt Regular nr. 1231594, Chile government, 2023-2026)
- Corpus-driven method. Different methods to automatize the analysis
- CPA-based project
- Team:
  - I. Renau, lead researcher
  - R. Nazar, researcher, computational linguist
  - D. Mora and N. Acosta, computational linguists
  - E. Puraivan, computer engineer
  - C. Suy, MA student
  - A. Alcaíno, assistant

# What is a metaphor?

- A metaphor is a **conceptual mechanism** in which a concept is used as base to understand or explain another one (Lakoff and Johnson 2003[1980], Kövecses 2020, Semino 2017, Steen 2023).
- Relation between the two concepts is like a '**vector**', so one concept is the origin of the other.
- **The domains must be different**, e.g., the domain of the ARTIFACTS vs. the domain of HUMANS (Barcelona 2003, Soriano 2012).
- The source domain **tends to be more concrete and the target domain more abstract**, but it is not always the case.

# What is a metaphor?

## PANDEMICS IS WAR



Fuente: Doquin de Saint Preux y Masid Blanco (2021: 38)

# The Verbario database

- <https://www.verbario.com>
- A database of Spanish verbs annotated with Corpus Pattern Analysis, CPA (Hanks 2004, 2013, Renau et al. 2019)
- With **CPA**, each annotated concordance is linked to a pattern, and each pattern to an implicature (= description of the meaning).
- Around 200 verbs + 50,000 concordances annotated manually
- Our goal is to create a **method** precise enough to support human task.



**verbario**

Semántica de los verbos en contexto

Versión Beta

# Metaphors in Verbario

- One can expect to find, for each verb, one **literal** meaning and, in polysemic verbs, one or more **figurative** meanings.
- **Polysemy** is the norm in Verbario.
- Frequent figurative meanings:
  - Metaphor
  - Metonymy

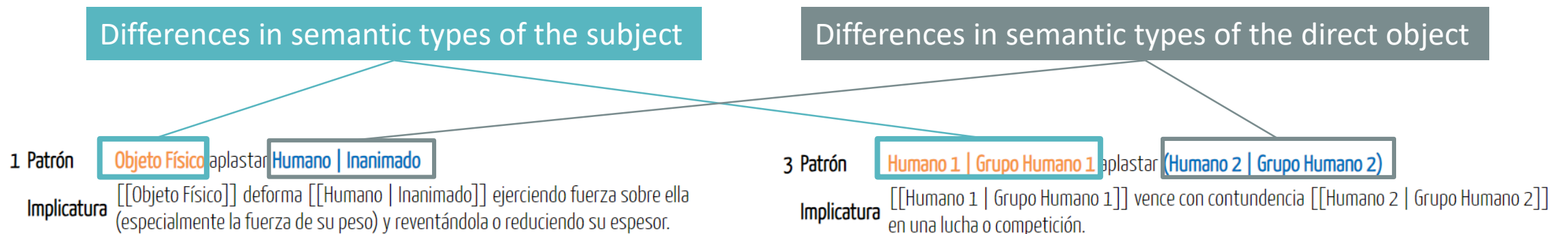
verbo <i>aplastar</i>	
Volver	
1 Patrón	<b>Objeto Físico</b> aplastar <b>Humano   Inanimado</b>
Implicatura	[[Objeto Físico]] deforma [[Humano   Inanimado]] ejerciendo fuerza sobre ella (especialmente la fuerza de su peso) y reventándola o reduciendo su espesor. Ver ejemplos de corpus
2 Patrón	<b>Humano 1   Grupo Humano 1</b> aplastar <b>Humano 2   Grupo Humano 2   Evento</b>
Implicatura	[[Humano 1   Grupo Humano 1]] debilita grandemente o aniquila [[Humano 2   Grupo Humano 2   Evento]]. Ver ejemplos de corpus

LITERAL MEANING  
(E.g., *Aplastar una lata*  
'to crush a can')

METAPHORICAL MEANING  
(E.g., *Aplastar al enemigo*  
'to crush the enemy')

# Metaphors in Verbario

- A possible **operationalization** of metaphor in CPA can be found in the differences between the arguments.
- **Semantic types** of patterns mapped to a literal meaning and to a metaphorical meaning should belong to different domains.
- It is difficult to operationalize the concept '**different domain**' in the CPA Ontology, e.g., [[Human]] is a subordinate of [[Physical Object]] in the ontology.





# Recurrent metaphors in Verbario

- **The same metaphorical structure can be found in more than one verb, providing evidence** of the pervasiveness of the conceptual metaphorical system in language, beyond the lexical level (Renau 2021).

- **dañar**

- **Patrón 1:** “El clavo **dañó** la rueda”

- (‘The nail damaged the wheel’)

- **OBJETO FÍSICO 1 **dañar** OBJETO FÍSICO 2**

- **Patrón 2:** “María **dañó** mucho a Marta”

- (‘María hurt Marta a lot’)

- **HUMANO 1 **dañar** HUMANO 2**

- **cubrir**

- **Patrón 1:** “Las nubes **cubrieron** el sol”

- (‘The clouds covered the sun’)

- **OBJETO FÍSICO 1 **cubrir** OBJETO FÍSICO 2**

- **Patrón 2:** “María **cubrió** a Marta en el trabajo”

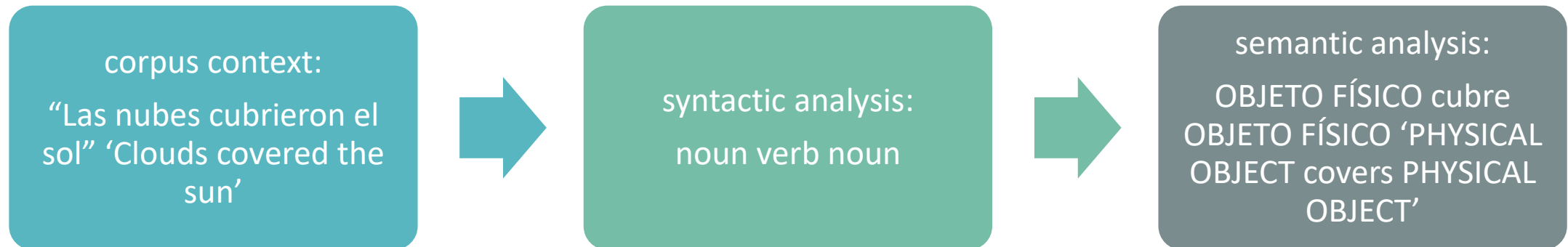
- (‘Maria covered Marta at work’)

- **HUMANO 1 **cubrir** HUMANO 2**

- Basic metaphor here: HUMANS ARE PHYSICAL OBJECTS

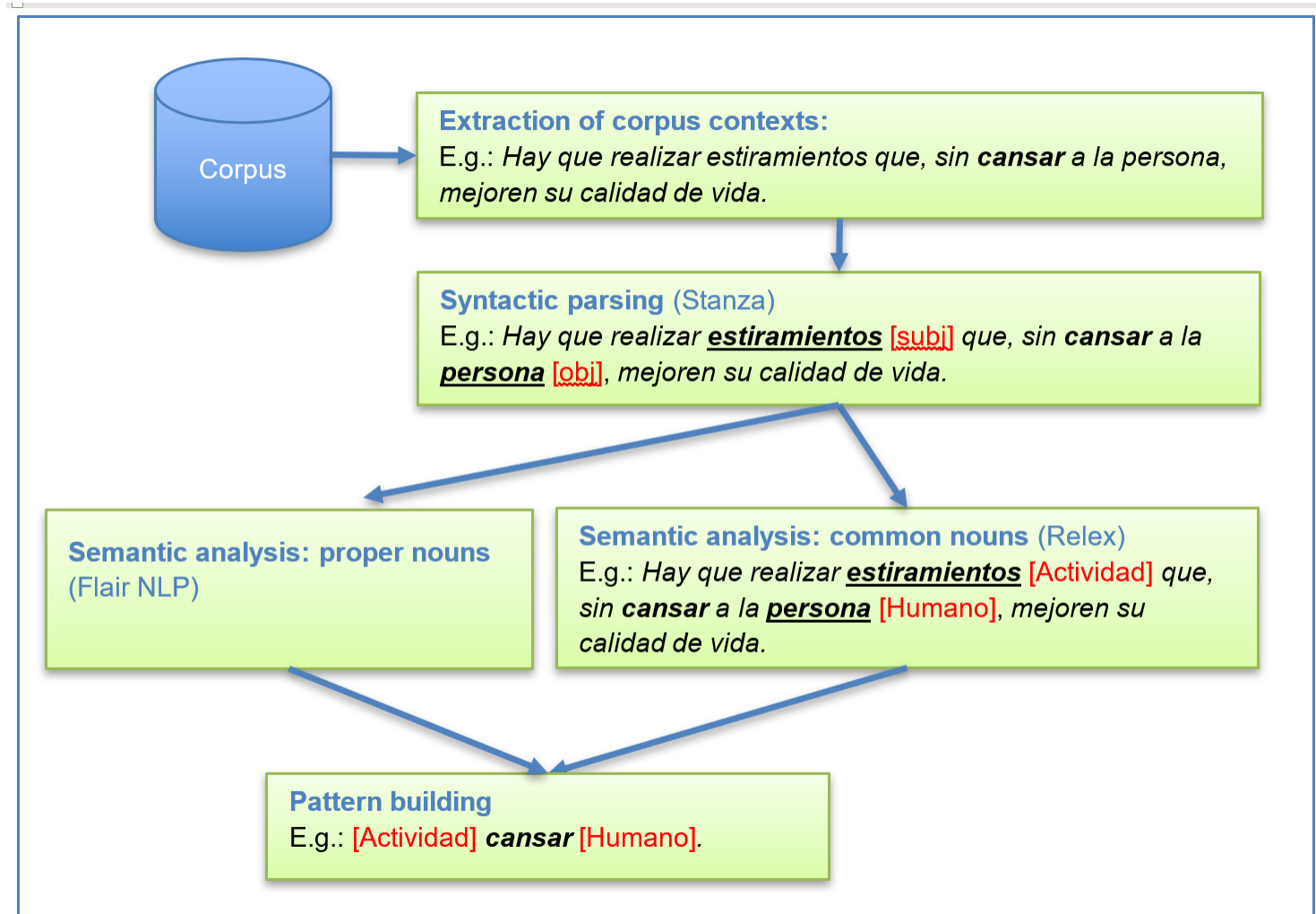
# Methods for computer generation of CPA patterns

- (cf. Giacomini and DiMuccio-Failla, 2019)
- In order to create the patterns with computer methods, **we emulate the human analysis** (Renau, Nazar and Mora, in preparation):



# Methods for computer generation of CPA patterns

- Synthesis of the method (Renau, Nazar and Mora, in preparation):



# Methods for computer generation of CPA patterns

- We are using **Wiktionary** to extract semantic labels and connect them to the ontology
- We use our own **sense disambiguation system** based on distributional analysis, with 75% precision:  
<http://www.tecling.com/relex>



The screenshot shows the Wiktionary page for the Spanish word "teatro". The page is in Spanish and includes the following information:

- Entrada:** [Discusión](#)
- Acciones:** [Leer](#), [Editar](#), [Ver historia](#), [Herramientas](#)
- Idiomas:** 40 idiomas
- Español:** [\[editar\]](#)
- Etimología 1:** [\[editar\]](#)  
Del latín *theatrum*, a su vez del griego antiguo *θέατρον*, del griego antiguo *θεᾶσθαι* ("mirar").
- Sustantivo masculino:** [\[editar\]](#)
- Formas:**

Singular	Plural
teatro	teatros
- Características:**

<b>pronunciación (AFI)</b>	[teˈa.tɾo]
<b>silabación</b>	te-a-tro <sup>1</sup>
<b>acentuación</b>	llana
<b>longitud silábica</b>	trisílaba
<b>rima</b>	a.tro
- Sense disambiguation (highlighted in red boxes):**
  - Género:** literario que comprende las obras concebidas para ser presentadas en un escenario ante un público.
  - Conjunto de obras:** de este género literario que pertenecen a un mismo autor, una misma época, país, etc.
    - **Ejemplo:** El *teatro* de Calderón.
  - Concepción:** artística y técnica de la escritura y de la representación de tales obras.
  - Profesión del actor:**

# Methods for computer generation of CPA patterns

- Some generated patterns (contrast literal-metaphorical):

## Patrón 3:

PERSONA despertar PERSONA

### Frecuencia: 29

1. La madre despierta a su hija .
2. Yo que usted , la despertaría .
3. Yo me desperté el primero .
4. ¿ Quién nos ; ha despertado de nuestro lecho ?
5. D'Artagnan despertó a Planchet y le ordenó ir a abrir .
6. Ella lo despierta todos los días a las 6:30 .
7. David me despertó cerca de las 06.45h para decir me que creía que algo pasaba .
8. Pero anoche , Garry me despertó a las dos preguntando me por Dotty .
9. Aquella criatura magnífica le despertaba solamente un sentimiento de repugnancia y compasión .
10. Ya sospechando la verdad desde hace tiempo , el Doctor despierta a la verdadera Martha , matando a el clon en el proceso .

## Patrón 4:

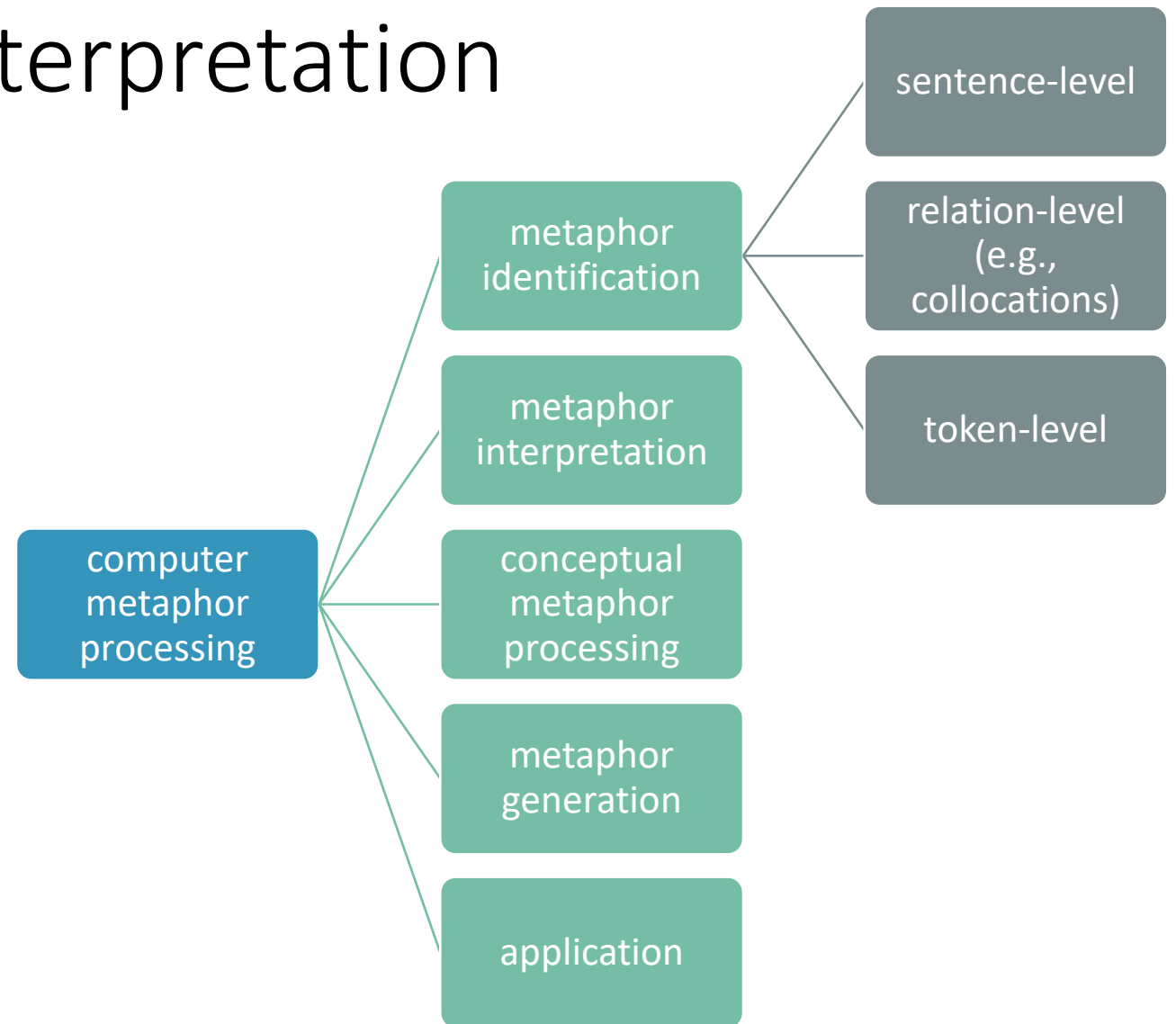
ACCIÓN despertar ACCIÓN

### Frecuencia: 28

1. Este planteamiento grupal despierta una gran resistencia .
2. A pesar de ello , el tema de una Europa social no despierta demasiado entusiasmo y ya ha provocado una hostilidad manifiesta entre algunos gobiernos de los Estados miembros .
3. La elección de el comunista Dimitris Christofias como presidente chipriota en febrero de 2008 despertó preocupación en el Reino Unido .
4. Ciertamente en Escocia este tema ha despertado controversias .
5. La amenaza de el terrorismo y la respuesta internacional a ese mal ha despertado nuevas preocupaciones que se relacionan con los derechos fundamentales y las libertades ciudadanas .
6. Sin embargo , la moderación de Eritrea ante esa provocación sólo despertó una mayor frustración en las fuerzas que desean promover la confrontación y desconocer el imperio de el derecho .
7. Sin embargo , despierta gran preocupación la baja tasa de desembolso de los recursos prometidos por la comunidad internacional para la recuperación económica y la reconstrucción de Burundi .
8. La designación de la primera dama ha despertado todo tipo de reacciones .
9. Los descubrimientos como el de Kepler 22b despiertan el entusiasmo por la astronomía y brindan oportunidades para enseñar ciencia a la gente ( y especialmente a los niños ) .
10. Este planteamiento basado en el grupo despierta una amplia resistencia .

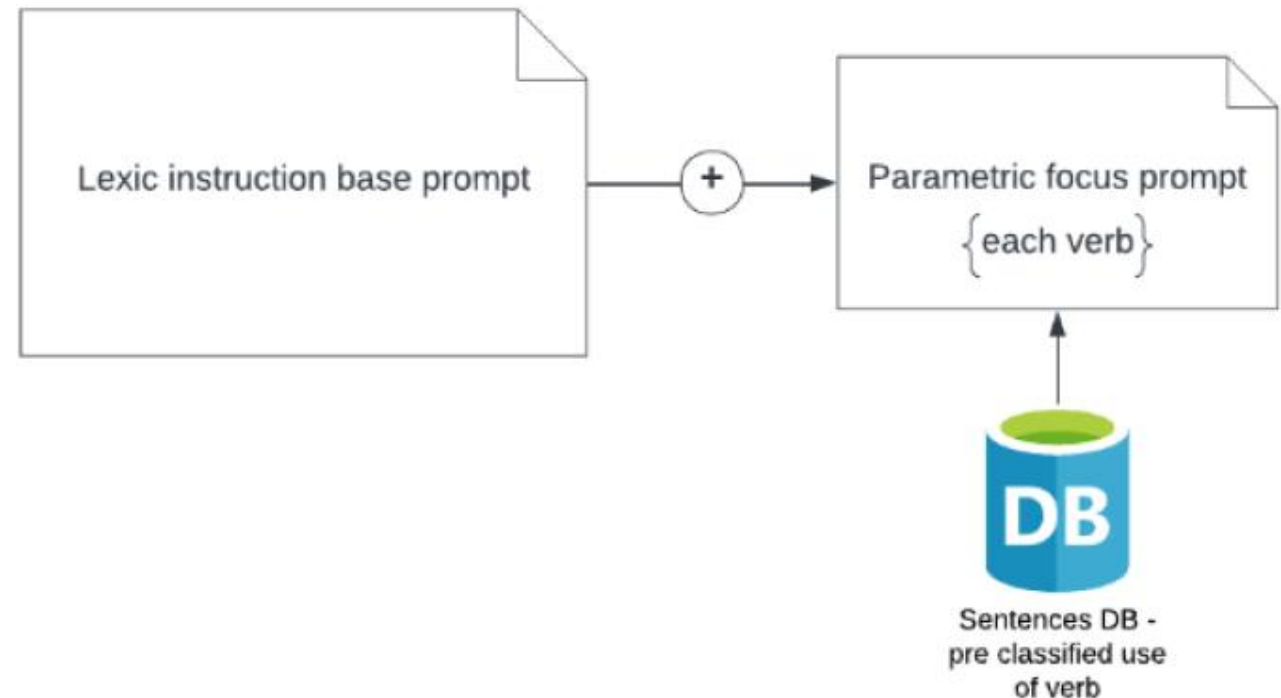
# Methods for computer metaphor identification and interpretation

- Computer metaphor processing: Rai and Chakraverty (2020), Tong et al. (2021), Ge et al. (2023). Many recent advances with deep learning.
- Best results in metaphor identification: around 89% F1 score.



# Methods for computer metaphor identification and interpretation

- Tasks for different versions of **ChatGPT-4** using 10 verbs in the Verbario database, manual (Puraivan and Renau, in preparation):
  - **Metaphor identification:** for each concordance, classify the use of the verb as 'literal' or as 'metaphorical'. (Only literal and metaphorical patterns included in the task).
  - **Metaphor interpretation:** for each concordance and decision of the previous step, provide an explanation of why this use of the verb is literal or metaphorical.



# Methods for computer metaphor identification and interpretation

- Prompt:

Specific conditions of the task

Theoretical aspects

Example

You will focus exclusively on determining whether this **verb**, in its specific use within the sentence, is **used literally or metaphorically**. It is important to distinguish the specific lexical analysis of the verb from any broader metaphorical interpretation that may arise from conceptual comparisons or equivalences present in the sentence. Consider that **conceptual metaphor** consists of understanding and experiencing one type of thing in terms of another, that is, it is the cognitive mechanism by which an experiential **domain** is partially assigned to a different domain, the second domain being partially understood in terms of the first. Both domains have to belong to different higher domains. **For example**, in the metaphor AN ARGUMENT IS A WAR, the source domain (WAR) serves to understand the target domain (ARGUMENT). A domain is a coherent organization of human experiences, the product of experience with one's own body, relationships with the physical environment, and relationships with other people.



# Methods for computer metaphor identification and interpretation

- Precision: 88.29% (ChatGPT-4, normal version)
- Recall: 100%
- Example (verb *golpear* 'to hit'):
  - Concordance: “En el relativamente tranquilo Kurdistán iraquí, la violencia sigue **golpeando** al resto del país” ‘Violence continues **hitting** the rest of the country’,
  - Analysis: **Metaphorical**
  - Explanation: “In this sentence, the verb ‘**hit**’ is used **metaphorically** to describe **the impact of violence on the country, without referring to a physical act of hitting. Violence cannot literally hit a country or its citizens** in the same way that one object or person hits another object or person. In this context, ‘hit’ used to evoke the idea that violence severely affects or negatively impacts the country, which is **a personification of violence** as a force that acts similarly to a being capable of hitting”.

# Provisional conclusions

- Combination of **syntactic and semantic parsers** to create CPA patterns is promising. Short-term tasks are focused on the last phase of the process of **pattern generation**.
- We can also test **generative AI** to create CPA patterns, but at the moment we prefer to control all the process ourselves.
- The system should allow us to have a core of verbs analysed with CPA to study metaphors (**types, dispersion among verbs, links to syntactic structure**, etc.)
- Task of metaphor identification with ChatGPT allows us to identify metaphors in corpus concordances. Short-term task is testing with more verbs, and mid-term task is working in the distinction between metaphor and **metonymy**.

# Words for Patrick

My dear friend,

These are some brief words to express my deepest and most sincere gratitude for all these years of guidance, wisdom, and generosity. I am writing in my poor English, so if you were here, you would already be correcting my grammar and pronunciation. You taught us some of the most important theoretical and methodological ideas of our careers. You taught me to love lexicography even more.



# Words for Patrick

During your several visits to Barcelona, we got enthusiastic about your proposals for the study of the lexicon, and start applying them to our work, especially Corpus Pattern Analysis.

We brought these ideas to Chile, where we started a new team of young linguists who learnt the technique and admire you without having known you personally. I want to thank you for years of conversations, debates, energy, excitement, and humor.



# Words for Patrick

Jorge Luis Borges, an Argentinian writer whom you admired greatly, says in one of his poems that “I imagined Paradise as a library” (instead of a garden, as is more common). If something like Heaven exists, it would be great if it had at least one big and rich library. I imagine you now in charge of the lexicography section, probably already proposing changes for its organization.

You will always be in our hearts, and we are forever grateful.





ic.1100-01-01  
COLLEGE OF THE AMERICAS  
Patrick Hanks

ic.1100-01-01  
COLLEGE OF THE AMERICAS  
Hanks



# Thank you!

Irene Renau

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