Now, forcing and causality

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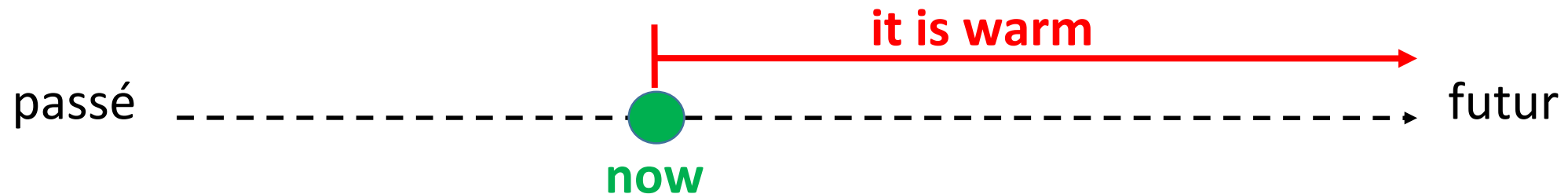CLLE (CNRS & Université de Toulouse 2)

Joint work with Giuseppe Spolaore (University of Padua)

Introductory notes:

We are actually interested in a "constellation" of time adverbs across languages, of which English *now* is one notable star …

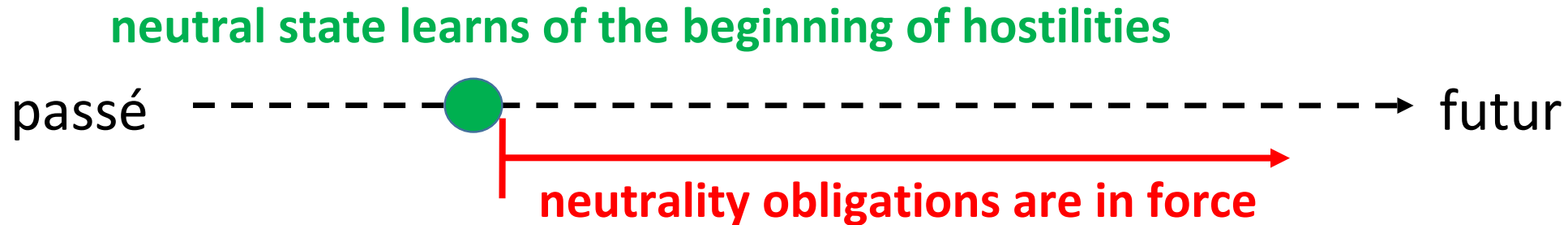# A constellation of time adverbs …

- **Désormais** (1) : Elle a acheté un climatiseur qui fonctionne également comme chauffage. « Il fera <u>désormais</u> chaud dans notre librairie et nous sommes impatients d'accueillir les enfants au club de lecture » ('She has bought an air conditioner that also works as a heater. « It will be warm <u>from now on</u> in our bookstore and we look forward to welcoming children in our reading club. »')

it is warm

passé   •   futur
                    now

désormais ☞ dès-or-mais (lit. 'from-now-onward')

A constellation of time adverbs …

- **Du moment que** (1) : Les devoirs de la neutralité prennent cours pour l'Etat neutre, du moment qu'il a eu connaissance de l'ouverture des hostilités.

    ('Neutrality obligations come into force for the neutral state, from the moment in which it learns of the beginning of the hostilities.')

neutral state learns of the beginning of hostilities

passé - - - - - - - ●- - - - - - - - - - - - - - - - → futur

neutrality obligations are in force

… with a double life

- **Désormais** (2) :

  Il est *désormais* trop tard.

  ('It is *now* too late.')

➢ Inevitability / necessity / irreversibility (cf. Bertinetto [2023] on Italian *ormai* 'already')

… with a double life

- **Du moment que** (2) :

  Du moment qu'il pense erronément que A, je vais lui démontrer que non-A.

  ('*Since* he erroneously thinks that A, I'm going to show him that non-A')

  ➤ Causality / consequentiality (cf. Le Draoulec & Bras [2006] on French *puis* and *aussitôt*)

Temporal vs. Modal

- In their life as time adverbs, *désormais / dès que …* operate on events

- In their second life, **what do those expressions operate on?**

  ➢ **That's THE question that we need to address if we want to provide a formal analysis of similar expressions**

Now:

Temporal location (VP-internal position)

- The English adverb *now* is typically used to **locate** a state or event at the moment of speech:

(1) a. One day, all persons [who are] *now* alive will be dead.

[Kamp (1971), van Benthem (1977)]

b. He told me yesterday that he would meet us *now* in this room.

Discourse uses (sentence-initial position)

- *Now* can also be used in **discourse functions** going beyond simple temporal location:

(2) The scientist dipped the felt into liquid air and the result was astonishing. Before being dipped into the liquid air, it had not caught fire; but *now* it exploded, it was consumed so rapidly.

[Hunter (2012)]

Contrast

- In the two uses, *now* has a **contrastive role** (=> **opposition between alternatives**):

  ➢ All persons who are **now alive** will be **dead at some other moment**

  ➢ 1. **At an antecedent time** the felt had not been dipped into the liquid air and **it had not caught fire**, 2. **now** it gets dipped into the liquid air and **it explodes**

- This contrastive role of *now* (or its translational equivalents in other languages) has been described by many scholars

  [Altshuler (2010), Hunter (2010, 2012), Lee & Choi (2009), Recanati (2004), Le Draoulec & Rebeyrolle (2018)]

A widespread ambiguity

- **VP-internal position**

(3) Je me rappelle ce qui est arrivé *au final*.   (French)
  ➢ **Temporal reading:** 'I remember that particular event that happened *at the end (of the contextually relevant party)*'

- **Sentence-initial position**

(4) Tout ce que je redoutais depuis le début de l'année est arrivé. *Au final,* ça n'a pas changé ma vie.   (French)
  ➢ **Modal reading (« *truth unpersistence* »)** : 'the adversities that happened this year haven't had a decisive impact on my life, *contrary to what I might have expected.*'
  [Amaral & Del Prete (2016)]

A widespread ambiguity

- **VP-internal position**

(5)   Vou *sempre* ao cinema no domingo à noite.   (European Portuguese)

'I always go to the movies on Sunday night.'

Temporal reading : I (habitually) go to the movies on *every Sunday night*

- **Sentence-initial position**

(6)   *Sempre* vou ao cinema no domingo à noite.   (European Portuguese)

'I'm still going to the movies this Sunday night.'

Modal reading (« truth persistence ») : My plan of going to the movies this Sunday night *continues to be valid*

[Amaral & Del Prete (2014)]

Now-initial sentences (Spolaore & Del Prete 2019)

(11) [Context : 13 September 2017, the IOC selects Paris as the host city of the 2024 OGs.] *Now* Paris will host the Olympic Games in 2024.

(12) [Context : 2011 World Championship in Athletics, Usain Bolt is disqualified for a false start.] *Now* Blake will win.

(13) [Context : The date of the couple's mariage has been changed.] *Now* John and Mary are getting married in April.

Now-initial sentences (Spolaore & Del Prete 2019)

(14) [Context : UCI has stripped L. Armstrong of his TdF titles because of doping.]
　　 Now Armstrong has no longer won any Tour de France titles.

　　 [Barlassina & Del Prete 2015]

(15) [Context : A theory change is accepted by scientists.]
　　 Now it was an asteroid and not climate change that killed dinosaurs.

(16) [Context : 24 August 2006, the International Astronomic Union recategorise Pluto as a "dwarf planet".]
　　 Now Pluto is not a planet anymore.

- In *now*-initial sentences, *now* seems to be vacuous: the proposition to its right is temporally saturated, so the question arises, **what is *now* doing there?**

  ➤ *Now* is certainly *not* saturating a time position in (11)-(16) – at least, not an *event time* position …

- Saturated by tense:

(11) *Now* <u>Paris will host the Olympic Games in 2024</u>.

(14) *Now* <u>Armstrong has not won any Tour de France titles</u> (anymore).

- No temporal argument (Individual-Level predicate):

(16) *Now* <u>Pluto is not a planet</u> (anymore).

Full Interpretation (Chomsky 1986)

"there is a **principle of full interpretation** (FI) that **requires that every element of LF [...] must receive an appropriate interpretation** – must be licensed in the sense indicated. [...] we cannot have sentences of the form [17], interpreted respectively as "I was in England last year," "John was here yesterday," "John saw Bill," and "everyone was here," simply disregarding the unlicensed bracketed elements:

[17] i. I was in England last year [the man]

ii. John was here yesterday [walked]

iii. [who] John saw Bill

iv. [every] everyone was here

This is not a logically necessary property of all possible languages; for example, FI is not observed in standard notations for quantification theory that permit vacuous quantifiers in well-formed expressions, as in [18i], which is assigned the same interpretation as [18ii]:

[18] i. ($\forall$x) (2+2 = 4)

ii. 2+2 = 4

But FI is a property of natural language."   [Chomsky 1986: 98]

Spolaore & Del Prete (2019)

"We consider sentences in which *now* occurs in initial position and show that the meaning they convey differs from the meaning of sentences that are otherwise identical except for *now* occurring in final position [e.g., (T) *vs.* (M)]. We argue that the occurrence of ***now* in initial position *triggers a particular kind of modal reading*** for the sentence to which the adverb is prefixed. A general notion of **modal forcing** is proposed to provide a uniform account of this kind of reading."

(T)   Paris is hosting the Olympic Games now.
(M)   Now Paris is hosting the Olympic Games in 2024.

Proposal in Spolaore & Del Prete (2019)

"*now* in the *now*-initial sentence ˹Now (that S_1) S_2˺ is a modal operator N with the following properties:

- **Stative Anchor:** N is ***anchored to a state s**** which obtains at reference time t_R and can be described by a *that*-clause argument of *now*

- **Forcing:** N triggers a ***forcing reading*** for its prejacent, whereby a contextually relevant **forcing relation** $\mathscr{F}$ is required to hold between s^* and the event $\boldsymbol{e}$ described by the prejacent S_2

- **Change of State:** ˹Now (that S_1) S_2˺ at t_R implies that, for any time t' that is in the past of t_R, $\mathscr{F}$ does not hold between any state obtaining at t' and the event $\boldsymbol{e}$ described by S_2"

- ## $\mathcal{F}$-*forcing*:

State s^* in world w^* at time t^* $\mathcal{F}$-forces the occurrence of a P-eventuality   (in symbols, $\Box_{s*}^{\mathcal{F}}$ $(w^*, t^*)[\lambda w.\lambda t.\lambda e.P(w)(t)(e)])$

iff

every $\mathcal{F}$-type alternative to w^* at t^* which is compatible with s^* is such that a P-eventuality occurs in it

(in symbols, $\forall w[\mathcal{F}\text{-alt}_{s*}(w^*,t^*,w) \rightarrow \exists e(P(w)(t^*)(e))])$

Now semantics in Spolaore & Del Prete (2019)

$[[\text{ now }]]_{c, g, w} = \lambda t^*. \; \lambda s^*. \; \lambda Q. \; \lambda P: CG_c(Q(s^*)(w)(t^*)). \; \square_{s*}^{\mathcal{F}}(w, t^*)[P]$

Assuming the reference time is c_t – the time of context c –, (12) is analyzed as follows:

(12)   *Now* [that Bolt has been disqualified] Blake will win.

$[[\; (12) \;]]_{c, g, c_w} = \text{True}$ *IFF*

- **Presupposition: $CG_c(\text{Bolt-is-disqualified}(s^*)(c_w)(c_t))$**
- **Assertion: $\square_{s*}^{\mathcal{F}}(c_w, c_t)[\lambda\text{w.} \; \lambda\text{t.} \; \lambda\text{e. Blake-will-win(w)(t)(e)}]$**

$\forall w \; [\mathcal{F}\text{-alt}_{s*}(c_w, c_t, w) \rightarrow \exists e \; \exists t \; (c_t \leq t \wedge \text{Blake-win}(w)(t)(e))]$

Status of the forcing relation

- Forcing is part of Truth-Conditional content:

$[[(12)]]_{c, g, c_w}$ = True   *IFF*

Assertion: $\square_{s*}^{\mathcal{F}}(c_w, c_t)[\lambda w. \lambda t. \lambda e. \text{Blake-will-win}(w)(t)(e)]$

A problem with embedding under intensional operators?

(19) a. It is probable that, now that Bolt has been disqualified, Blake will win.

b. Maria believes that, now that Bolt has been disqualified, Blake will win.

- (19a,b) both embed (12) under an intensional operator, but the **intensional operator does not seem to take scope over the forcing**:
  - ➤ (19a) means that the fact that Bolt has been disqualified makes it probable that Blake will win
  - ➤ (19b) means that the fact that Bolt has been disqualified makes Maria believe that Blake will win

- Our hypothesis: a uniform category of modal uses of *now* characterized by the properties below

  - ➢ A **change** $\vec{C}$ takes place

  - ➢ *Now* is **anchored to a situation s*** that is located after $\vec{C}$

  - ➢ **s*** can be described by a **"*that*-clause" appearing after** *now*

  - ➢ **s*** is **opposed** to another situation, **S$_{ante}$,** that is located before $\vec{C}$

  - ➢ $\vec{C}$ has a **causal impact ($\approx$ $\mathcal{F}$-*forcing*) on the events** in the surroundings of **s*** (often—but not always—in the future of **s***)

- Example 1 : future

(12) Now **[that IOC has made its plan]** Paris will host the Olympic Games in 2024.

➢ $\overrightarrow{C}$ =IOC nominates Paris host city of the 2024 OGs

➢ Situation **S*** > $\overrightarrow{C}$ is described by ***that*-clause**

➢ $\overrightarrow{C}$ has a causal impact on the events around **S***, in particular $\overrightarrow{C}$ makes it so that Paris will host the 2024 OGs

➢ **S*** is opposed to a situation **S$_{ante}$** < $\overrightarrow{C}$ at which it was not yet determined that Paris would host the 2024 OGs

- Example 2 : past

(14) Now **[that UCI has applied its sanctions]** Armstrong has not won any TdF titles

➢ $\overrightarrow{C}$ = UCI's sanctions are applied

➢ the situation **S*** > $\overrightarrow{C}$ is described by the **_that_-clause** in boldface

➢ $\overrightarrow{C}$ has an impact on the events around **S***, in particular $\overrightarrow{C}$ makes it so that Armstrong did not win any TdF titles between 2000 and 2007

➢ **S*** is opposed to a situation **S**$_{ante}$ < $\overrightarrow{C}$ at which it was not yet determined that Armstrong did not win any TdF titles between 2000 and 2007

Homonymy or polysemy?

(7) The after-school reception has been working since the start of the school year. It is functioning at cruising speed *now*.

(7') L'accueil périscolaire fonctionne depuis la rentrée. Il est arrivé *maintenant* à sa vitesse de croisière.

(8) One of your house mates has cheated in a Hogwarts exam by using a Self-Spelling Quill. *Now* he has come top of the class in Charms.

(8') Un de vos camarades de maison a triché lors d'un examen de Poudlard en utilisant une plume d'orthographe. *Maintenant* [*grâce à son stratagème*], il est arrivé premier de la classe en Charmes.

Against homonymy

- The alternation is attested for English *now* and French *maintenant* – two words with **no common etymology**

- It is attested for Italian *ora* as well (that has yet another etymology) :

(7'') Il dopo-scuola funziona dall'inizio del nuovo anno scolastico. *Ora* ha raggiunto la sua velocità di crociera.

(8'') Uno dei vostri compagni di casa ha imbrogliato a un esame a Hogwarts usando una penna magica e *ora* è primo della classe di *Charms*.

Languages lexically resolving the polysemy

- European Portuguese (Patrícia Amaral, p.c.):

(7''') O serviço de tempos livres da escola está a funcionar desde o início do ano escolar. *Neste momento* alcançou velocidade de cruzeiro.

(8''') Um dos vossos colegas fez batota num exame em Hogwarts ao usar uma pena mágica. *Agora* é o primeiro da turma na aula de encantamentos.

- See Lee & Choi (2009) on two *NOWs* in Korean: *cikum* (purely referential to perspective time) vs. *icey* (presupposes a change of state + refers to perspective time)

Unequal modifiability

- Beyond the difference in syntactic position, we observe a difference wrt <u>modifiability via *only*</u> :

(19) The after-school reception has been working since the start of the school year. 🙂 *Only now* is it functioning at cruising speed.

Cf. 'L'accueil périscolaire fonctionne depuis la rentrée. *Ce n'est que maintenant* qu'il est arrivé à sa vitesse de croisière.'

(20) One of your house mates has cheated in a Hogwarts exam by using a Self-Spelling Quill. 🙁 *Only now* has he come top of the class in Charms.

Cf. 'Un de vos camarades de maison a triché lors d'un examen de Poudlard en utilisant une plume d'orthographe. *Ce n'est que maintenant* qu'il est arrivé premier de la classe en Charms.'

Conclusions

- **A unique semantic core** for *now*, whatever the syntactic position? Is a unified semantic analysis of *now* possible?

- Can we separate a **constant semantic core** of *now* from **other components that are dependent on properties of discourse structure**?

- *A priori* desirable to apply Ockam's Razor to the lexicon – do not multiply lexical entries beyond necessity! How tenable in view of the linguistic data?
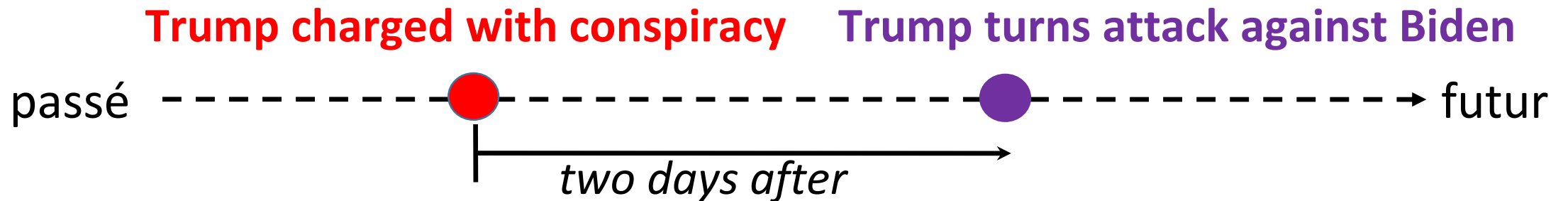
Thank you!

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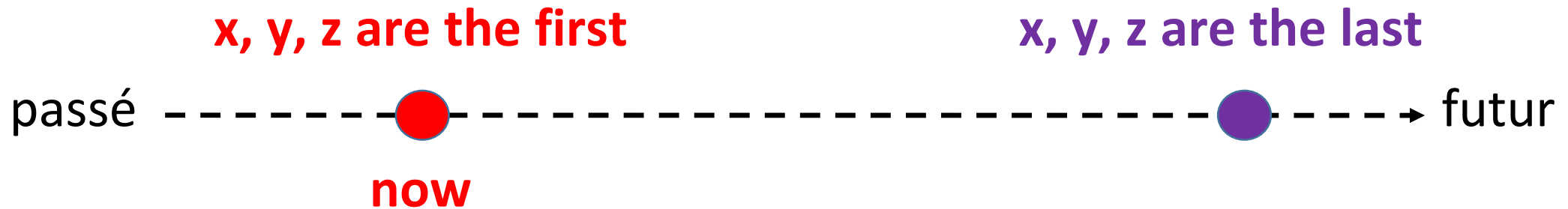Stosic, D. 2020. *La polysémie au coeur de la langue*. Mémoire d'HDR, Université de Toulouse Jean Jaurès.

A constellation of time adverbs …

- **Après** (1) : Deux jours <u>après qu</u>'il a été accusé de mettre en danger la démocratie, l'ancien président américain a renvoyé l'attaque à son successeur

  ('Two days <u>after</u> he has been charged to have put democracy in danger, the former American president turns the attack against his successor')

Trump charged with conspiracy **Trump turns attack against Biden**

passé — — — — — — — — 🔴 — — — — — — — — 🟣 — — — — — — — → futur

two days after

A constellation of time adverbs …

- **Maintenant** (1) : Beaucoup qui sont <u>maintenant</u> les premiers seront les derniers, et ceux qui sont <u>maintenant</u> les derniers seront les premiers

  ('Many who are <u>now</u> the first will be the last, and those who are <u>now</u> the last will be the first')

x, y, z are the first   **x, y, z are the last**

passé – – – – – – – – ⬤ – – – – – – – – – – – – – – – – – ⬤ – – → futur

now

… with a double life

- **Après** (2) :

  Moi perso, je te crois. *Après*, il faudra bien que tu produises des preuves pour convaincre les autres.

  ('Personally, I believe you. *But with this being said*, you'll need to provide evidence to convince the others')

➢ "Rupture" / "prise de distance" (Le Draoulec & Rebeyrolles [2018])

… with a double life

- **Maintenant** (2) :

  Maintenant [que Bolt a été disqualifié], c'est Blake qui va gagner !

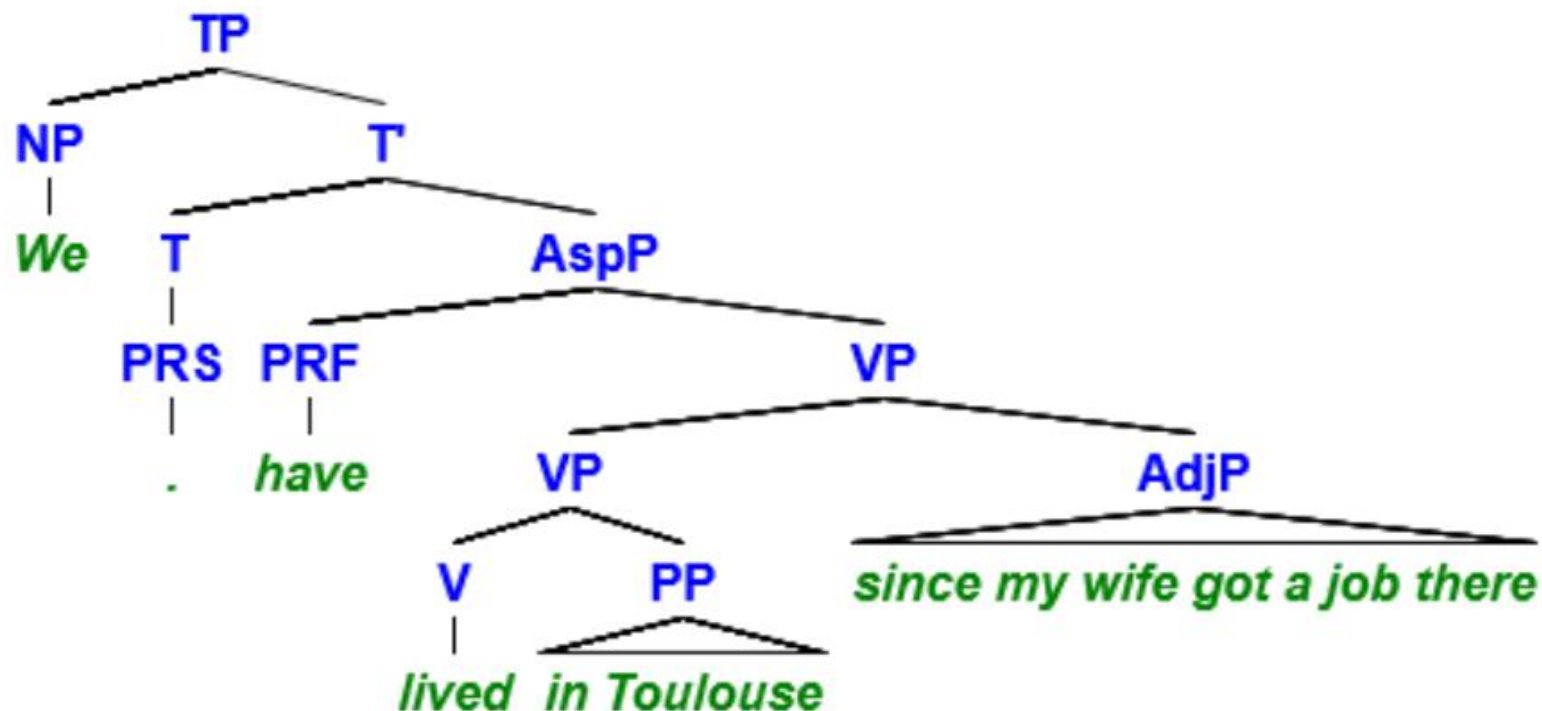 ('*Now* [that Bolt has been disqualified], Blake will win!')

➢ Necessity ($\approx$ *désormais* – cf. « C'est *désormais* Blake qui va gagner ! ») / "Forcing" (Spolaore & Del Prete 2019)

A widespread ambiguity

- **VP-internal position** (adjunction to the VP)

(3) We have lived in Toulouse *since my wife got a job there*.

Temporal reading of *since S* : the state of our living in Toulouse continues from the event of my wife getting a job in Toulouse
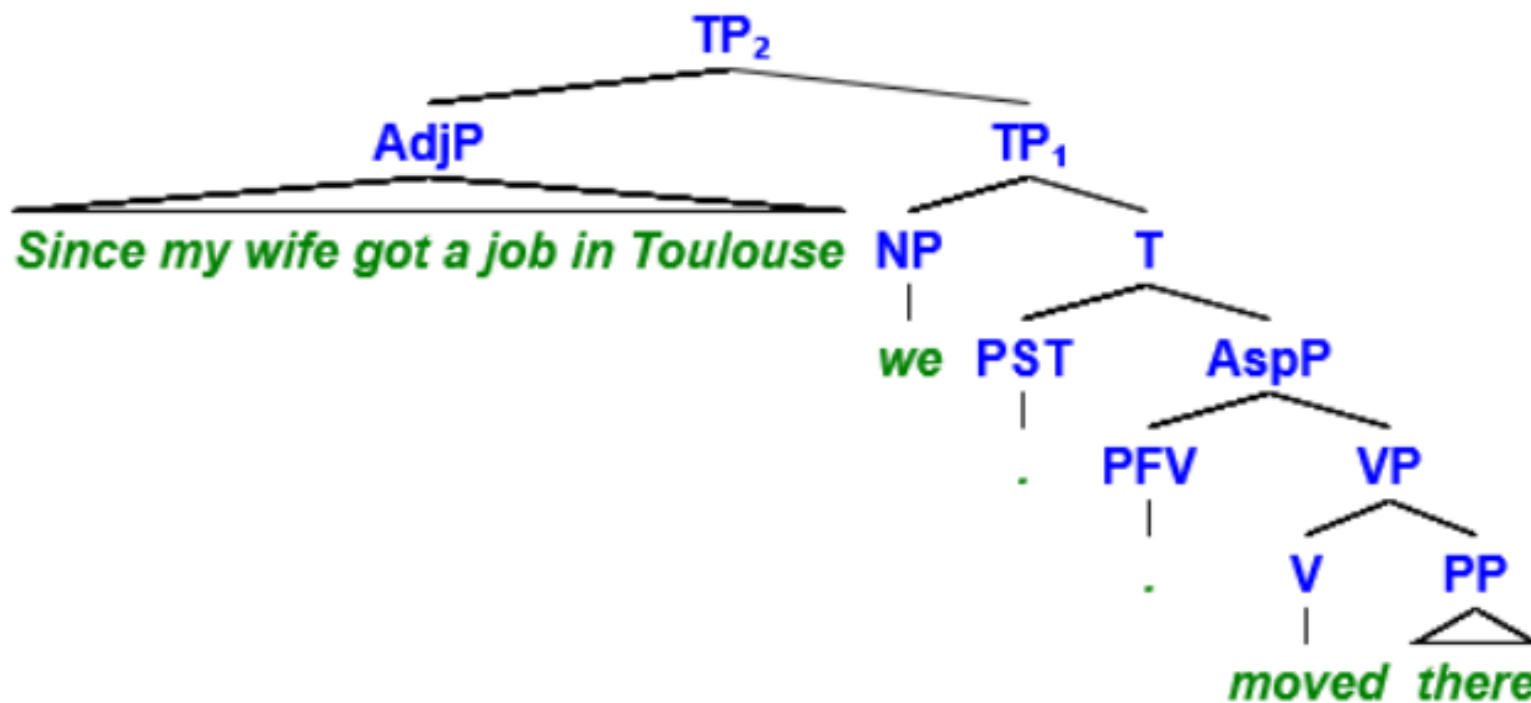
A widespread ambiguity

- **Sentence-initial position**

(4) *Since my wife got a job in Toulouse* we moved there.

➢ **Modal (*causal*) reading of _since S_** : our moving to Toulouse was caused by the event of my wife getting a job in Toulouse

Other adverbs (French)

- **VP-internal position**

(7) L'accueil périscolaire fonctionne depuis la rentrée. Il est arrivé *maintenant* à sa vitesse de croisière.

➢ **Lecture *temporelle* :** l'accueil fonctionne *à présent* à son rythme normal.

- **Sentence-initial position**

(8) Un de vos camarades de maison a triché lors d'un examen de Poudlard en utilisant une plume d'orthographe. *Maintenant,* il est arrivé premier de la classe en Charmes*.

➢ **Lecture *modale* :** votre camarade a utilisé une plume ensorcellée et *grâce à son stratagème* il est arrivé premier.

What kind of relation between the two interpretations of *now*?

- Are the two interpretations of *now* due to lexical **ambiguity / homonymy** (*Je mange un **avocat** / Je parle avec mon **avocat***)?

- Or rather a case of regular **polysemy** (*Ce pont est une **construction** très solide / La **construction** de ce pont dure depuis 2 ans*)?

[Stosic (2020), Abrard & Stosic (2021)]

McHugh (2022) on causality sentences

- "three seemingly distinct properties of the semantics of *cause* and *because*. [1] their comparative nature: interpreting *cause* and *because* involves comparing what would happen in the presence of the cause (a positive condition) with what would happen in the absence of the cause (a negative condition). [2] there is an asymmetry in logical strength between the two conditions: the positive condition involves a universal modal while the negative condition involves an existential modal. [3] the positive and negative conditions have the same modal base, i.e. are interpreted while assuming the same set of background facts."