



# Modeling dialogues in a dynamic theory of types

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# MODELING DIALOGUES IN A DYNAMIC THEORY OF TYPES

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IN OTHER WORDS

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$A_1$  Do you want coffee or tea?

$A_1$  Do you want coffee or tea?

$B_2$  Yes!

A<sub>1</sub> Do you want coffee or tea?

B<sub>2</sub> Yes!

- Natural Language Processing (NLP)
- Semantics of Natural Language
- Semantics of dialogues
- Statistical NLP **VS** Formal NLP?

A<sub>1</sub> Do you want coffee or tea?

B<sub>2</sub> Yes!

- Natural Language Processing (NLP)
- Semantics of Natural Language
- Semantics of dialogues
- Statistical NLP **VS** Formal NLP?
- Formal NLP **then** Statistical NLP!

DATA, DATA, DATA

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Transcriptions of conversations in English between college students in Illinois (US) in an informal setting.

Transcriptions of conversations in English between college students in Illinois (US) in an informal setting.

**A<sub>1</sub>** When will you guys get off?

**B<sub>2</sub>** My last exam is like...I don't know, maybe on Monday or on Tuesday...

**A<sub>1</sub>** Vous décollez quand les gens?

**B<sub>2</sub>** Mon dernier exam est...je sais pas, peut être lundi ou mardi...

Recordings and transcriptions of philosophical (semi-guided) conversations in French between children from 6 to 10 years old and an adult.

Recordings and transcriptions of philosophical (semi-guided) conversations in French between children from 6 to 10 years old and an adult.

A<sub>1</sub> À qui vous osez pas poser des questions?

B<sub>2</sub> À ceux qu'on connaît.

A<sub>3</sub> Ah, ça c'est ceux à qui tu oses poser des questions?

B<sub>4</sub> Oui.

A<sub>1</sub> Who do you not dare to ask questions?

B<sub>2</sub> People we know.

A<sub>3</sub> Oh, those are ones who you dare ask questions?

B<sub>4</sub> Yes.

Anonymised transcriptions of semi-structured interviews in French performed by psychologists with either patients with schizophrenia under medication, patients with schizophrenia without medication or control patients (without any known diagnosis)

[Rebuschi et al., 2014].

A<sub>1</sub> Oh ouais et pis compliqué et c'est vraiment très très compliqué **la politique** c'est quelque chose quand on s'en occupe **faut être gagnant** parce qu'autrement quand on est perdant c'est fini quoi

B<sub>2</sub> Oui

A<sub>3</sub> J. C. D. **est mort**, L. **est mort**, P. **est mort** euh (...)

B<sub>4</sub> Ils sont morts parce qu'ils ont perdu à votre avis

A<sub>5</sub> Non ils gagnaient mais **si ils sont morts, c'est la maladie** quoi c'est c'est

A<sub>1</sub> Oh and it's complicated and **politics** is really very complicated, it's something when you do that, you **need to win** because otherwise when you lose it's the end you know

B<sub>2</sub> Yes

A<sub>3</sub> J. C. D. **is dead**, L. **is dead**, P. **is dead** hum (...)

B<sub>4</sub> They died because they lost, according to you

A<sub>5</sub> No, they were winning but **if they died, it was out of sickness** you know it's it's

# TYPE THEORY AND ALL THAT

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[de Groote, 2006]

<b>Types:</b>	individual/entity	$\iota$
	proposition	$o$
	context	$\gamma$



[de Groote, 2006]

Types: individual/entity  $\iota$   
 proposition  $o$   
 context  $\gamma$

Mary loves Jane.

$\lambda e k. \text{love } j \ m \wedge k(m :: j :: e)$

e	$\gamma$
k	$\gamma \rightarrow o$
j,m	$\iota$
love	$\iota \rightarrow \iota \rightarrow o$

# REPRESENTATIONS

A<sub>1</sub> Vous habitez où?

B<sub>2</sub> À T.

A<sub>3</sub> C'est dans la ville de L.

B<sub>4</sub> Oui.

A<sub>1</sub> Where do you live?

B<sub>2</sub> In T.

A<sub>3</sub> Is it in the city of L?

B<sub>4</sub> Yes.

$$\left[ \begin{array}{c} \text{LIVE} \\ \text{Ag: B} \\ \text{Loc: } \left[ \begin{array}{c} \text{IS IN} \\ \text{Ag: T} \\ \text{Loc: L} \end{array} \right] \end{array} \right]$$

[Kallmeyer et al., 2015]

BACK TO THE PRESENT AND FUTURE




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**Frame Semantics** Real-life examples (embedded frames)

**RNNs** Not enough data (generalization)

**Inquisitive semantics** Handling questions and answers  
[Ciardelli et al., 2012]

**Machine Learning** Learning on logical representations  
[Roberts and Demner-Fushman, 2016]

-  Ciardelli, I., Groenendijk, J., and Roelofsen, F. (2012). Inquisitive semantics. NASSLLI lecture notes, volume 187.
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THANK YOU.