

The Dynamics of Framing in Dialogue

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How do we tackle framing?

- We study the way frames evolve over the course of a dialogue
- We are not interested in topic-based framing



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How do we tackle framing?

- Offer a formal treatment of what constitutes a framing move
- Make the framework amenable to computational linguistic processing



Our research



Dagstuhl seminar: *Framing in Communication: From Theories to Computation*

Researchers from different fields: NLP, computational linguistics, philosophy, pragmatics, argumentation...

At the seminar:

- initial framework development

After the seminar:

- iterative process of data investigation and theory development



Pillar stones



Frame discourse unit (FDU): a string of contiguous text of any length.



Frame: distribution of salience values in an FDU



Framing move: a label that characterise the transitions between speaker moves

Frame discourse unit

- a) Jilly: *Crime is like a dreadful plague in this country.*
- b) Timmy: *Indeed, this infection needs to be eradicated. It's infecting our cities, our towns and our boroughs.*



Frame discourse unit

- a) Jilly: *FDU0[Crime is like a dreadful plague in this country.]*
- b) Timmy: *FDU1[Indeed, this infection needs to be eradicated.]*
FDU2[It's infecting our cities, our towns and our boroughs.]



Pillar stones



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Inspired by Entman
(1993)

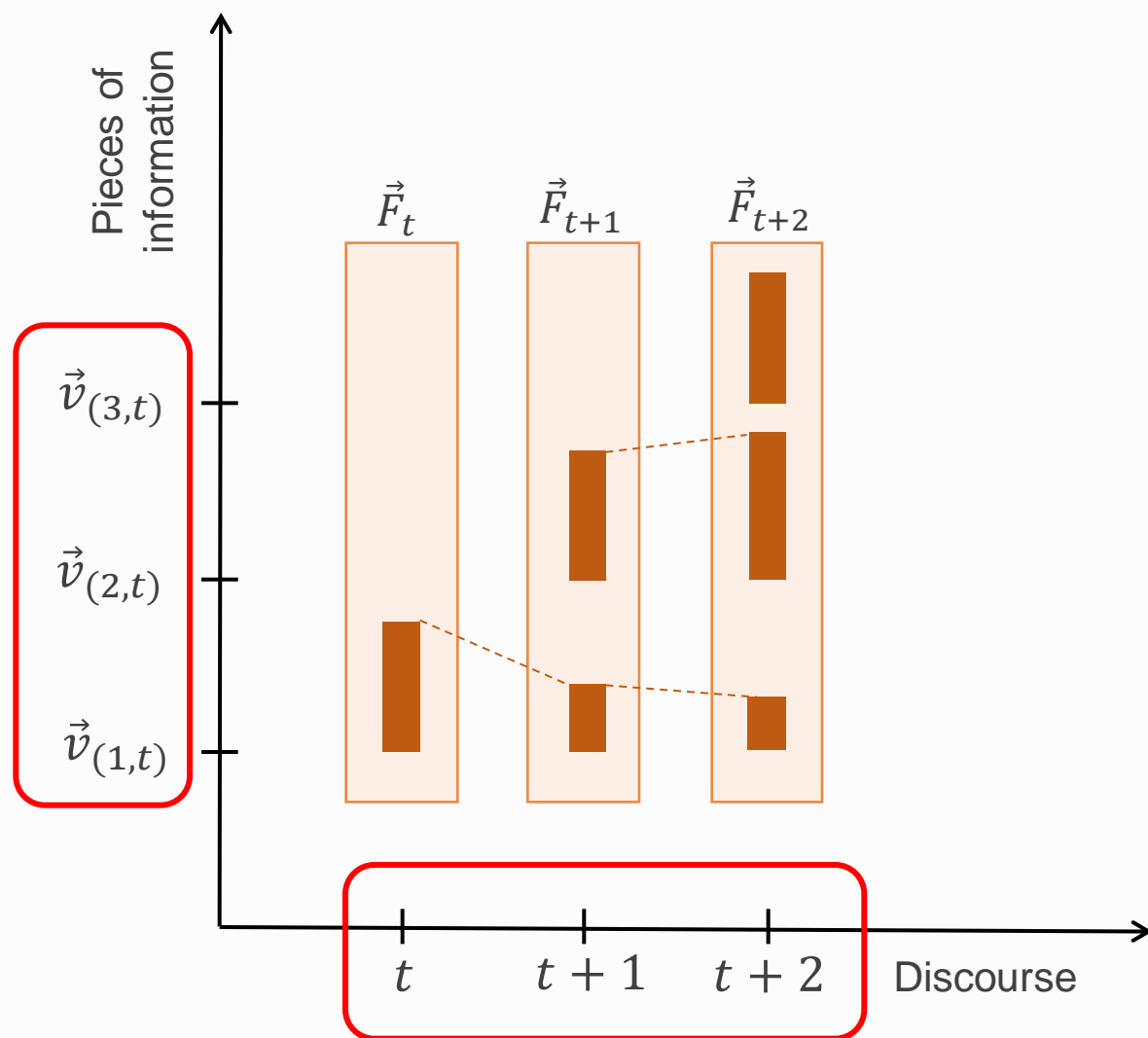


Frame: distribution of salience values in an FDU



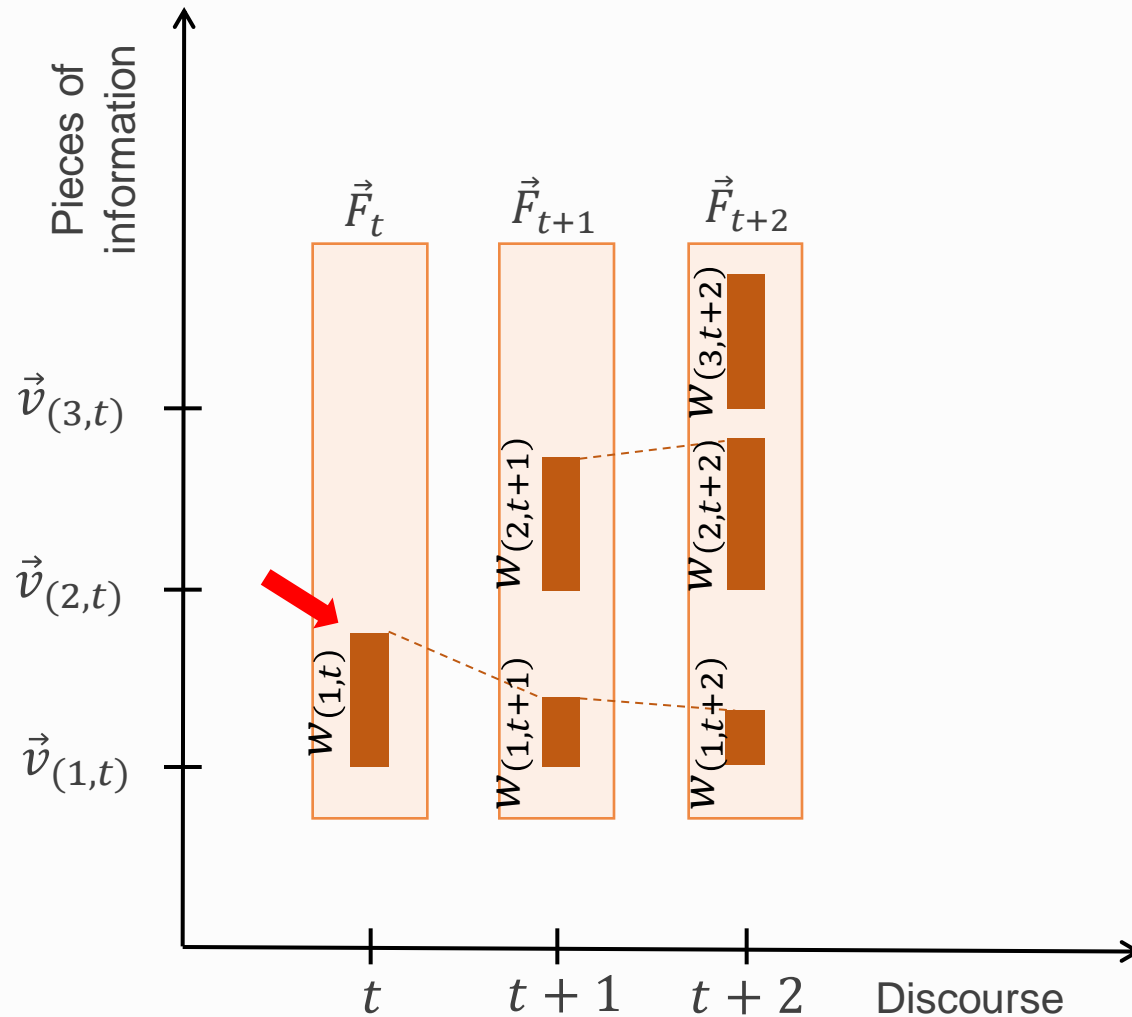
Framing move: a label that characterise the transitions between speaker moves

What constitutes a frame?



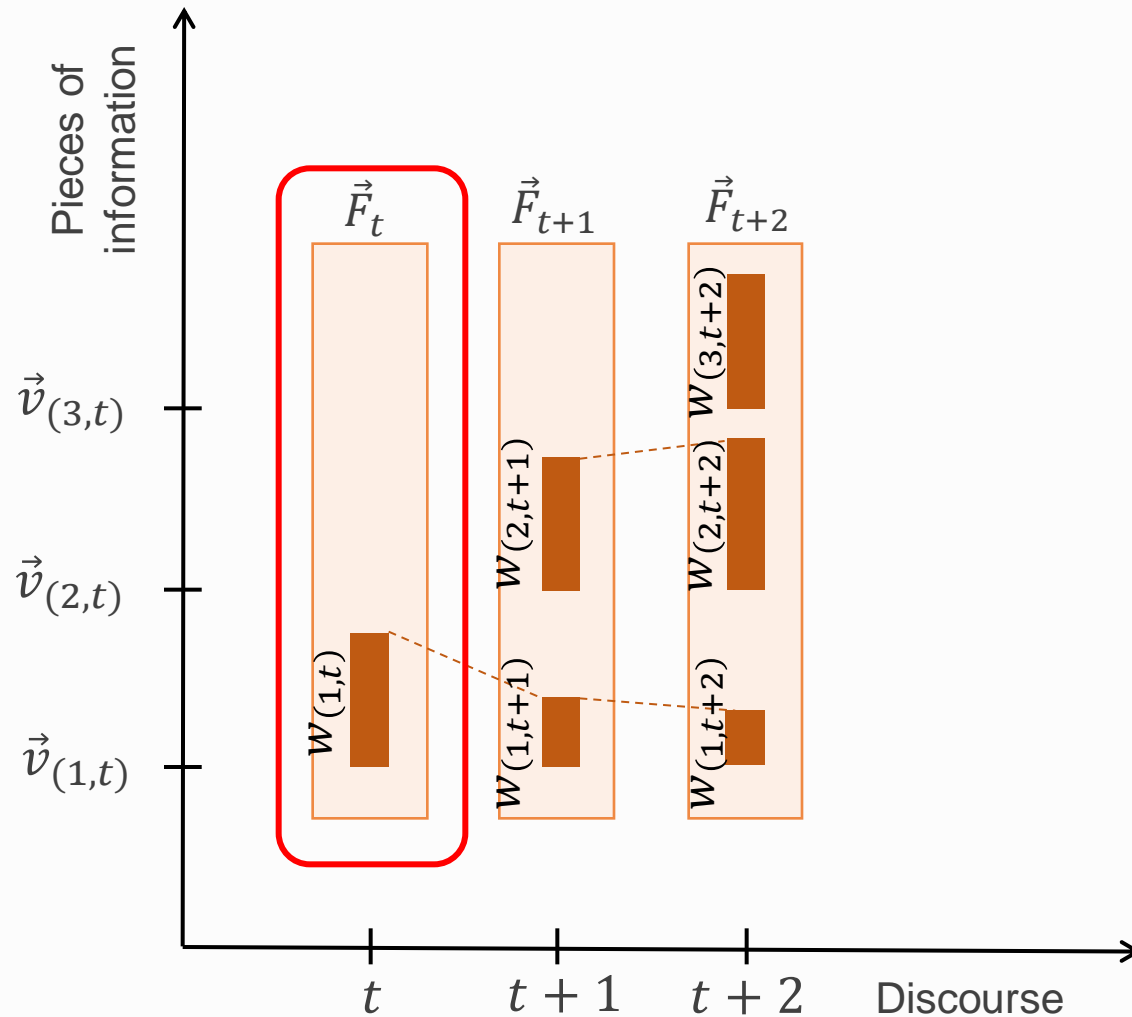
- t represents linear progression of the discourse
- $\vec{v}_{(i,t)}$ stores “pieces of information”, e.g. sentence embeddings

What constitutes a frame?



- The importance, relevance and accessibility of every element in the vector is assigned a weight reflecting its overall salience: $w_{(i,t)}, \dots, w_{(j,t)}$

What constitutes a frame?



- A frame \vec{F}_t assigns a distribution of salience values over a set of dimensions $\vec{v}_{(i,t)}, \dots, \vec{v}_{(j,t)}$ at a given state t in the discourse
- A frame \vec{F}_t is comprised of a set of ordered pairs $(\vec{v}_{(i,t)}, w_{(i,t)})$

Pillar stones



Frame discourse unit (FDU): a string of contiguous text of any length.

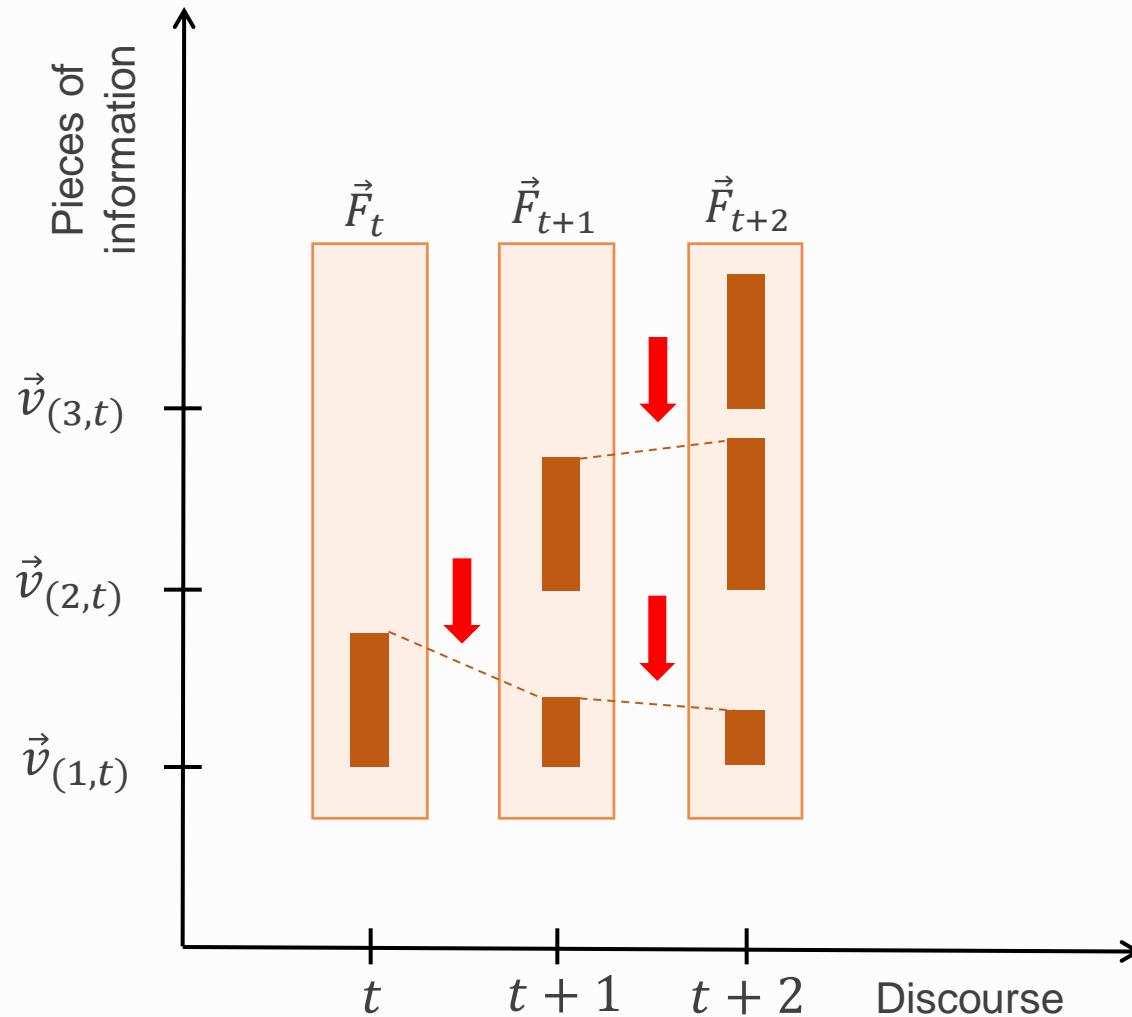


Frame: distribution of salience values in an FDU



Framing move: a label that characterise the transitions between speaker moves

Framing moves



- Framing moves define the change in salience weight distribution between two frames \vec{F}_0 and \vec{F}_1

Framing moves

Similar to Frame alignment by
Snow et al. (1986)

Start

Initiates a frame

Take on

Accepts a frame and continues it; new speaker

Resume

Switches to an already existing frame; same or new speaker

Elaborate

Increases or reduces specificity of a frame; same or new speaker

Reframe

Modifies a frame but maintains some continuity; same or new speaker

Switch

Introduces a new (different) frame without necessarily rejecting the previous frame; same or new speaker

Merge

Selectively combines two or more frames; same or new speaker

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Framing moves

- a) Jilly: *FDU0*[**Crime is like a dreadful plague in this country.**] **START**
- b) Timmy: *FDU1*[Indeed, this infection needs to be eradicated.]
FDU2[It's infecting our cities, our towns and our boroughs.]



Framing move constraints

- a) Jilly: F_{DU0} [**Crime is like a dreadful plague in this country.**] **START**
- b) Timmy: F_{DU1} [Indeed, this infection needs to be eradicated.]
 F_{DU2} [It's infecting our cities, our towns and our boroughs.]

Initiating constraint (a dialogical constraint):

Start move is the first turn in a discourse $t = 0$




Framing moves

- a) Jilly: *FDU0[**Crime is like a dreadful plague in this country.**]* ←
- b) Timmy: *FDU1[**Indeed, this infection needs to be eradicated.**]* TAKE ON
- FDU2[It's infecting our cities, our towns and our boroughs.]*



Framing move constraints

- a) Jilly: $_{FDU0}$ [**Crime is like a dreadful plague in this country.**] 
- b) Timmy: $_{FDU1}$ [**Indeed, this infection needs to be eradicated.**] **TAKE ON**
- $_{FDU2}$ [It's infecting our cities, our towns and our boroughs.]

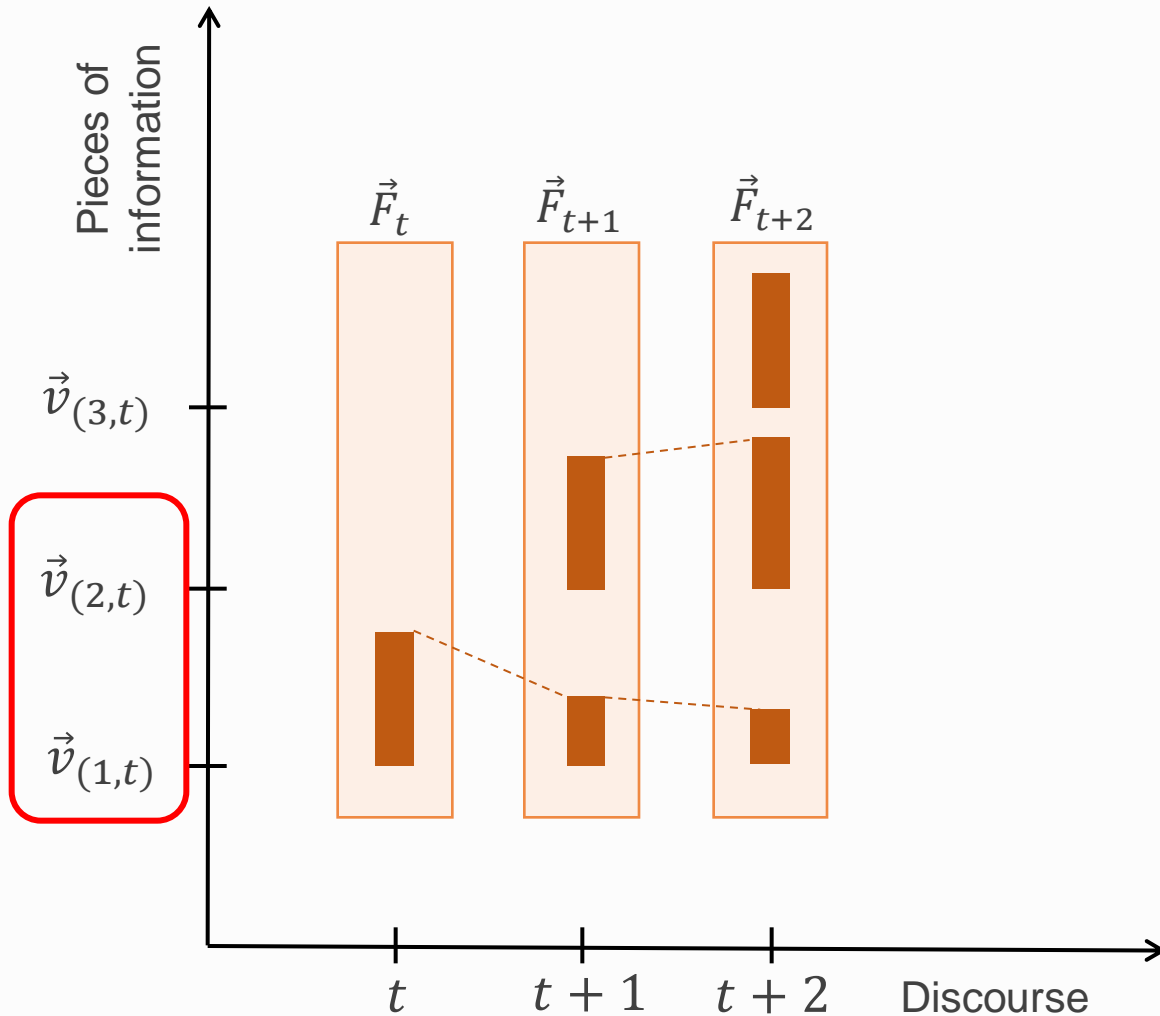
Alternate speaker constraint (dialogical constraint)

A take on move can only be performed by a speaker different to that responsible for originally introducing the frame

$$s(\vec{F}_i) \neq s(\vec{F}_j))$$



Framing move constraints



Content constraint

Everything that has increased from old to new must be semantically extremely close by to something that was already active

$\forall i \text{ s.t. } ((\vec{v}_{(i,t)}, w_{(i,t)}) \in \text{active}(\vec{F}_t) \text{ and } \exists (\vec{v}_{(i,t-1)}, w_{(i,t-1)}) \in \text{active}(\vec{F}_{t-1}) \text{ where } w_{(i,t)} > w_{(i,t-1)}),$

$\exists (\vec{v}_{(j,t-1)} \in \text{active}(\vec{F}_{t-1})),$
 $\tau_{\text{proximal}} < \delta(\vec{v}_{(j,t-1)}, \vec{v}_{(i,t)})$
 $< \tau_{\text{nonproximal}}$

Framing moves

a) Jilly:

FDU0[Crime is like a dreadful plague in this country.]

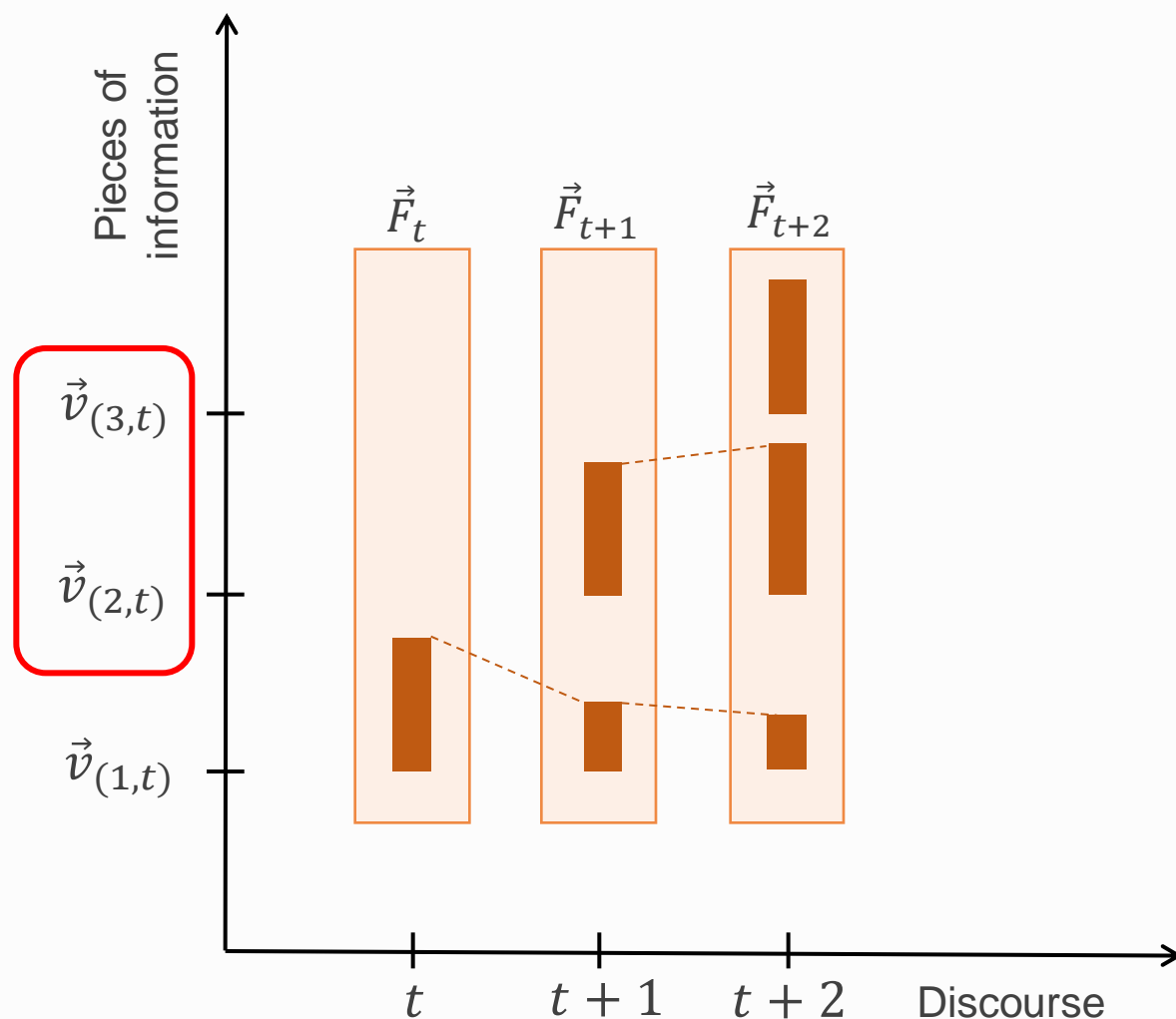
b) Timmy:

*FDU1[**Indeed, this infection needs to be eradicated.**]*

*FDU2[**It's infecting our cities, our towns and our boroughs.**] ELABORATE*



Framing move constraints



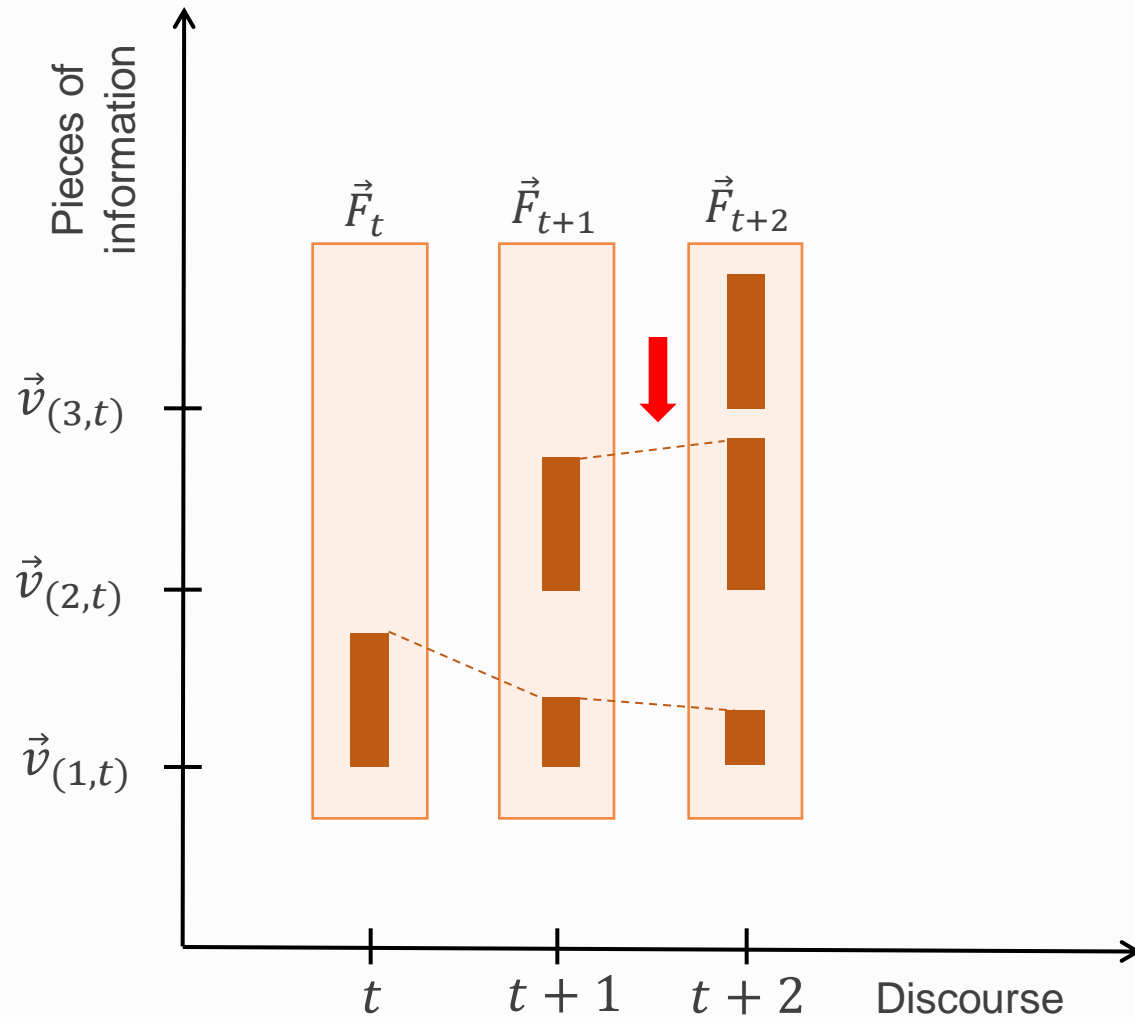
Content constraint

Everything that has increased from old to new must be semantically close by to something that was already active

$\forall i \text{ s.t. } \left(\left(\vec{v}_{(i,t)}, w_{(i,t)} \right) \in \text{active}(\vec{F}_t) \text{ and } \exists \left(\vec{v}_{(i,t-1)}, w_{(i,t-1)} \right) \in \text{active}(\vec{F}_{t-1}) \text{ where } w_{(i,t)} > w_{(i,t-1)} \right),$

$\exists \left(\vec{v}_{(j,t-1)} \in \text{active}(\vec{F}_{t-1}) \right),$
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Framing move constraints

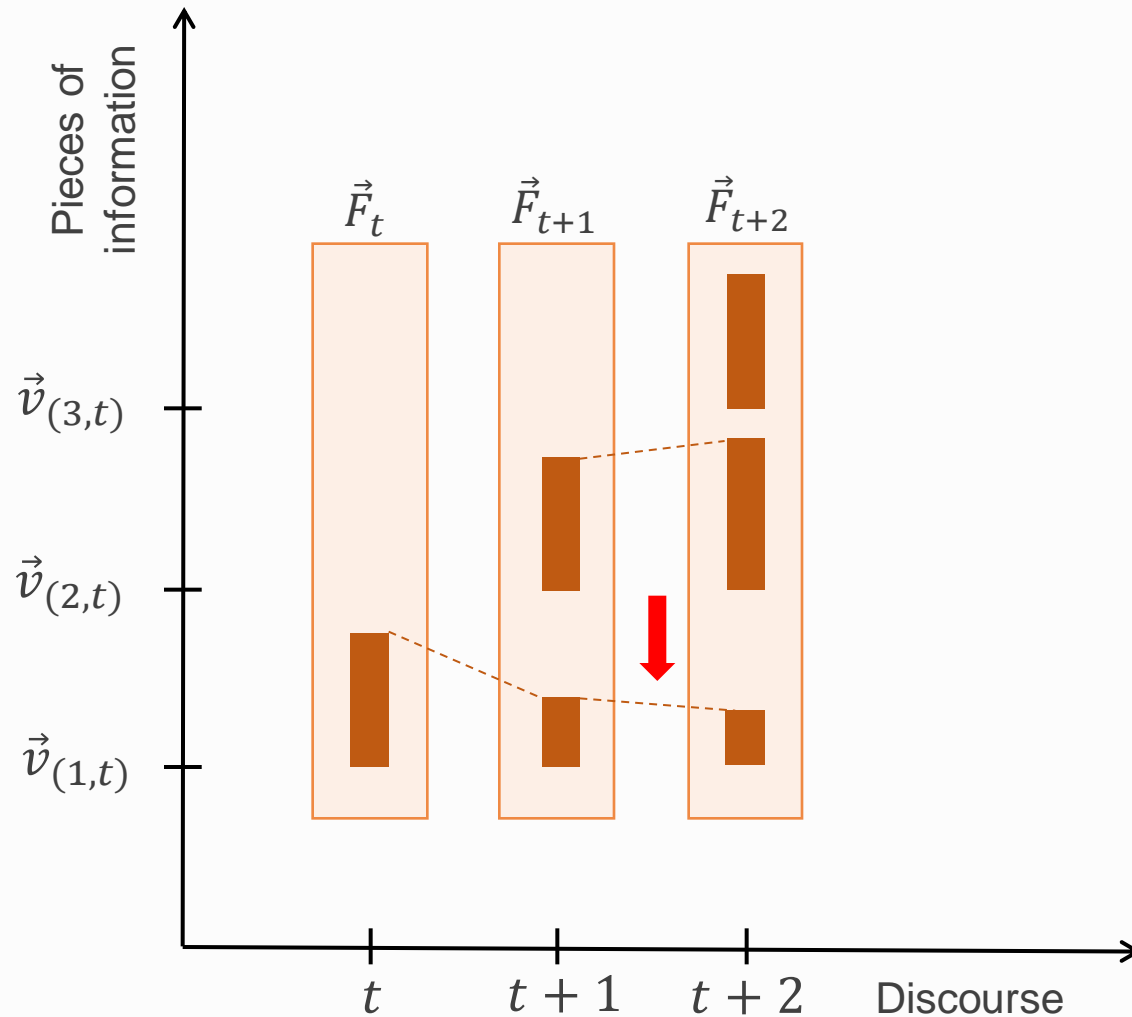


Aggregate increase constraint (a magnitude constraint)

The aggregate of increases must be small enough.

$$\forall i \text{ s. t. } \left((\vec{v}_{(i,t)}, w_{(i,t)}) \in \text{active}(\vec{F}_t) \text{ and } \exists (\vec{v}_{(i,t-1)}, w_{(i,t-1)}) \in \text{active}(\vec{F}_t) \text{ where } w_{(i,t)} > w_{(i,t-1)} \right), \sum (w_{(i,t)} - w_{(i,t-1)}) < \tau_{large}$$

Framing move constraints

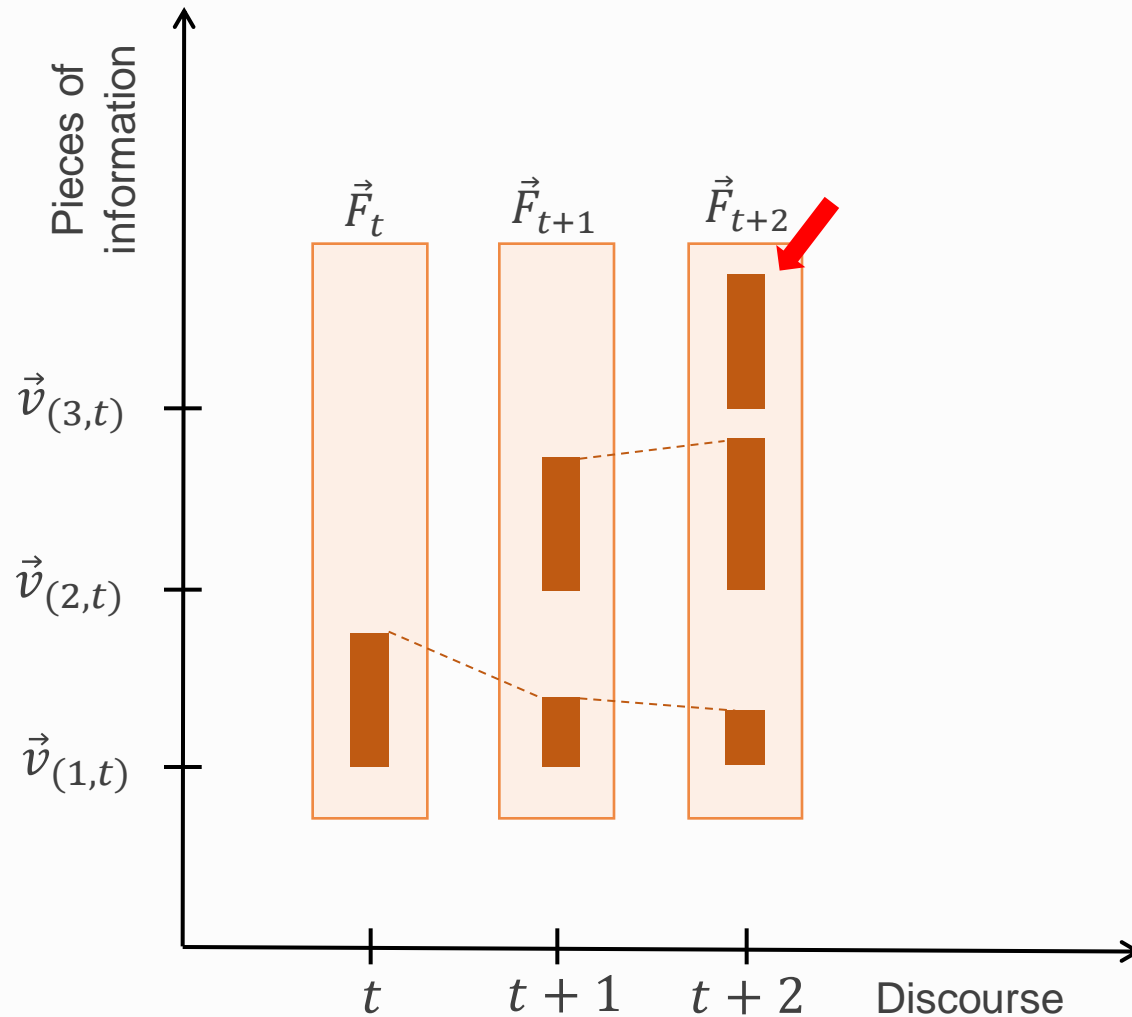


Aggregate decrease constraint (a magnitude constraint):

The aggregate of decreases must be large enough.

$$\forall i \text{ s.t. } \left((\vec{v}_{(i,t)}, w_{(i,t)}) \in \text{active}(\vec{F}_t) \text{ and } \exists (\vec{v}_{(i,t-1)}, w_{(i,t-1)}) \in \text{active}(\vec{F}_t) \text{ where } w_{(i,t)} > w_{(i,t-1)} \right), \sum (w_{(i,t-1)} - w_{(i,t)}) < \tau_{\text{large}}$$

Framing move constraints



Novelty constraint

The proportion of things that are activated must be great enough — there must be enough novelty.

$$\begin{aligned} & \text{active}(\vec{F}_t) \supset \text{active}(\vec{F}_{t-1}), \\ & \frac{|\text{active}(\vec{F}_t)|}{|\text{active}(\vec{F}_{t-1})|} > \tau_{\text{novelty}} \end{aligned}$$

Empirical validity

Four constraints:

- Dialogical constraints (initiating, alternating speaker, contiguousness)
- Content constraints
- Magnitude constraints (aggregated increase and decrease)
- Novelty constraints

Data analysed:

- Complete “crime as an infection” example
- One Wiki Talk data
- Loveline example (Coulson, 2005)¹

¹<http://kroq.radio.com/shows>

Summary

- A formal framework for frame dynamics in dialogue that is amenable to computational linguistic analysis
- Exhaustive list of frame moves
- Parameters are variable and can be set according to the task

