

Frame semantics and FrameNet

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From Case Grammar to FrameNet

Important texts:

- Fillmore, Charles J. (1968): The case for case. In Bach and Harms (Ed.): Universals in Linguistic Theory. New York: Holt, Rinehart, and Winston, 1-88.
- Fillmore, Charles J. (1976): Frame semantics and the nature of language. In Annals of the New York Academy of Sciences: Conference on the Origin and Development of Language and Speech, Volume 280: 20-32.
- Fillmore, Charles J. (1977): Scenes-and-frames semantics, Linguistic Structures Processing. In Zampolli, Antonio (Ed.): Fundamental Studies in Computer Science, No. 59, North Holland Publishing, 55-88.
- Fillmore, Charles J. (1977): The need for a frame semantics in linguistics, In Karlgren, Hans (Ed.): Statistical Methods in Linguistics 12: 5-29.
- Fillmore, Charles J. (1982): Frame semantics. In Linguistics in the Morning Calm, Seoul, Hanshin Publishing Co., 111-137.
- Fillmore, Charles J. (1985): Frames and the semantics of understanding. In Quaderni di Semantica, Vol. 6.2: 222-254.

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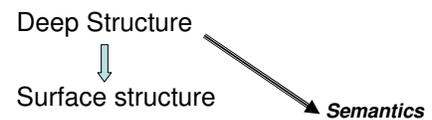
From Case Grammar to FrameNet

- Fillmore, Charles J. and B. T. S. Atkins (1992): Towards a frame-based organization of the lexicon: The semantics of RISK and its neighbors. In Lehrer, A and E. Kittay (Eds.) Frames, Fields, and Contrast: New Essays in Semantics and Lexical Organization. Hillsdale: Lawrence Erlbaum Associates, 75-102.
- Fillmore, Charles J. and B. T. S. Atkins (1994): Starting where the dictionaries stop: The challenge for computational lexicography. In Atkins, B. T. S. and A. Zampolli (Eds.) Computational Approaches to the Lexicon. Oxford: Oxford University Press, 349-393.

Papers about FrameNet

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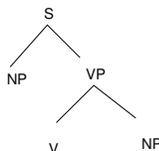
From Case Grammar to FrameNet



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The nature of syntactic deep structure – phrase markers



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Sample sentences that match the previous DS.:

The boy broke the window
The ball broke the window
The wind broke the window
A tree branch broke a window

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Some more sentences:

The boy broke the window with the ball

The ball broke the window

The boy broke the window with the baseball bat

**The baseball bat broke the window*

**The wind broke the window with a tree branch*

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Need to distinguish:

The boy

The ball

The bat

The branch

The wind

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The differences somehow similar to those overtly marked by case-endings in languages with declension (cases)

Being dominated by „S“, „VP“, „PP“ not enough

Deep structure „cases“ – deep cases – may never be overtly marked

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What deep cases and how many?

As few as possible

Distinguishing between different NP's appearing in the same syntactical position (internal or external argument) of the same verb

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A notional and methodological confusion:

Deep cases vs. The roles of actants (MTM)

Deep cases:	Actants' roles
Interpretative Distinguishing valences of the same verb (they don't tell you what's going on)	Encoding Depend on the situation (they do tell you what's going on)

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Deep cases vs. The roles of actants (MTM)

The commercial transaction:

John sold a book to Paul

DC: SOURCE GOAL

MTM: AGENT COUNTERAGENT

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Paul stole a book from John

DC	AGENT	SOURCE
MTM	AGENT	PATIENT?

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John sold a book to Paul

DC:	SOURCE	GOAL
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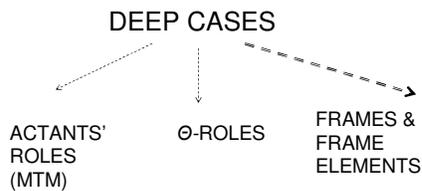
Paul stole a book from John

DC:	AGENT	SOURCE
-----	-------	--------

Entailment: John has the book no longer

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The boy broke the window with the ball
 (by throwing the ball,
 by hitting the ball with the baseball bat
 ? by hitting the window while holding the ball in his hand)

The boy broke the window with the baseball bat
 (by hitting the window with the bat
 ?by throwing the bat)

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- (1) *John* _[SOURCE] *sold a book to Paul*
- (2) *Paul stole a book from John* _[SOURCE]
- (1,2) John has the book no longer.
 (2) John has a right to reposses the book

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Possible constraints:
 Arguments with several roles?
 e.g. selling: SOURCE/AGENT?

„This last difficulty is that of seeing the relationship between the case functions that seem to be involved in every sentence [...] and the sort of role structure that is involved in the description of particular kinds of institutionalized transactions for which a „field“ of vocabulary may exist in a language. I have in mind the roles of customer, merchant, goods, and instrument of exchange in the vocabulary field that includes BUY, SELL, PAY, DICKER, etc. [...]

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I am at the moment ready to assume that it may be necessary to treat the semantic roles of arguments on two 'levels; I mean that I may want to be able to say that in expressions with BUY there is one argument which has Customer function on one 'level', Agent function on another, whereas in expressions with SELL the argument which has the Agent function is the Merchant, not the Customer. [...]The roles associated with a predicate word may not bear a one-to-one correspondence with the arguments associated with it." (p.15, „Subjects, speakers, and roles“, in: D.Davidson, G. Hartman (eds.) *Semantics of Natural Language*“, Dodrecht 1972)

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Institutionalized transactions:

commercial transactions
court verdicts

Non-institutionalized, societally accepted situations

Knowledge about both is needed to understand utterances

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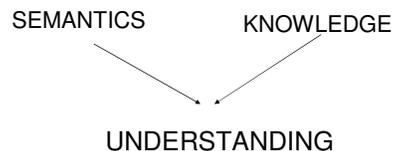
The ball broke the window. Paul would have to pay for the damage out of his pocket money.

?The branch broke the window. Paul would have to pay for the damage out of his pocket money.

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Interpretative semantics, whatever it is, is not enough to account for understanding.



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Why do you need knowledge?

Mary went to John's restaurant. The waitress brought her tea. The tea was cold. She left a very small tip.

Mary went to John's party. John's mother brought her tea. The tea was cold. She left a very small tip.

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Why do you need knowledge?

Mary went to John's restaurant. John's mother brought her tea. The tea was cold. She left a very small tip.

Mary went to John's restaurant. John's mother brought her tea. She didn't let her pay for the tea.

Mary went to John's party. John's mother brought her tea. She didn't let her pay for the tea.

(Adapted from Abelson and Shank)

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Representing knowledge:

Scripts
Scenarios
Frames
.....

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Situation related frames (Minsky)

Word frames (Fillmore)

restaurant invokes/evokes a frame
mother invokes/evokes a different frame
party invokes/evokes a frame
Etc.

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Simple word frames – (related terms,
semantic field)

family relations: *mother, father, brother,
sister*

Days of the week: *Monday...; week-end;
weekday*

Times of the day: *morning, noon,
afternoon...*

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Frames may be created or modified by
social usage:

All kind of scales:

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The grading example (Weisberger 1962)

A:	B:	C:
sehr gut	sehr gut	sehr gut
gut	gut	gut
genügend	genügend	befriedigend
mangelhaft	mangelhaft	ausreichend
	ungenügend	mangelhaft
		ungenügend

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Other scales

'first class hotel'

'large packet'

Other frames:

'week-end'

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Framing the week in different languages:

PL. Poniedziałek	PR. 2a-feira
wtorek (2nd)	3a-feira
środa (middle, comp. DE Mittwoch)	4a-feira
czwartek (4th)	5a-feira
piątek (5th)	6a-feira

...

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„And on the seventh day God ended his work which he had made; and he rested on the seventh day from all his work which he had made”

(Gen.2.2., King James' Bible)

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Frames are socially construed and reflected within language:

PL: *wolna sobota* 'lit. free Saturday'
sobota pracująca (robocza)
'lit. working Saturday'

Adjectives mark 'frame alternation' or a 'departure from frame'

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- working mother
- birth mother/genetic mother/biological mother
- genuine leather
- digital/analog watch
- CD/analog record
- acoustic guitar
- unplugged

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Frame alternation:

woman	:	girl
man	:	boy

A counterexample:

orphan

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Frame Semantics vs. Truth semantics:

Valid point: semantics is interpretative,
Frame Semantics: what is understood
Truth Semantics: truth conditions,
entailments, etc.

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My dad wasted most of the morning on a bus:

↓ [entailment]

The speaker's male parent spent some part of a day in a vehicle

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Understanding:

- 1) The speaker is not a grown-up
- 2) The speaker is not talking to a member of his own household
- 3) The time in question was somehow between 8 AM and 12 PM.
- 4) The vehicle in question was moving along its regular route (in service)
- 5) The presence of the speaker's father was irrelevant to the route the bus was taking...
- 6) The parent's time could have been better employed...

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Frame semantics vs. Truth semantics

Words don't just denote...

They evoke frames.

(or are used by the Speaker to invoke frames)

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Dad: The speaker is not a grown-up

My dad: The speaker is not talking to a member of his own household

Morning: day as working day as opposed to calendar day

On a bus: A vehicle in service

Wasted: 'TIME IS PRECIOUS'

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„quasi synonyms”

In a vehicle/on a vehicle

Land/ground (the same „piece” of Earth)

„land ⇔ sea” frame

„ground ⇔ air” frame:

They spent two hours on land/on the ground

Those birds never leave the land// the ground

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Shore/coast

A journey from shore to shore.

A journey from coast to coast.

An American usage:

back east ⇔ out west

in mufti (not in uniform)

Japanese *nurui* lukewarm (of liquids that should be hot)

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Technical parlance:

The suspect:

The defendant:

The culprit.

The police has arrested the

? The police has no clue as to the indentity of the suspect.

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More frame-evoking words:

generous ⇔ stingy [sharing is good]

wasteful ⇔ thrifty [prudence is good]

<-----spending----->

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The FrameNet project

A lexicographic-cum-computational linguistic project to provide:

- a) Descriptive frames for verbs and other words that denote „situations/scenarios“. Frames include: scenarios, participants (i.e. frame elements, FE)
- b) Description of word-senses (lexical units, LU) within appropriate frames.

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- c) examples of actual use of LUs in question (corpus) annotated syntactically and in terms of FE
- d) A description of each LU in terms of its syntactic properties, and place within a given frame.
- e) Relations between frames.

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- Word/Lemma/LU

The word *bake* is polysemous
= the lemma *bake* (v.) with its word-forms is linked to three frames (three LU)

Apply_heat: Michelle baked the potatoes for 45 minutes

Cooking_creation: Michelle baked her mother a cake for her birthday

Absorb_heat: The potatoes have to bake for more than 30 minutes

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- The procedure: looking at corpus attestations of words that have some semantic overlap and dividing them into large enough chunks, to create frames:
- The number of elements must be the same for LUs pertaining to the same frame
- The type of elements must be the same for LUs pertaining to the same frame.

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Number of FE: The lemmas *increase/decrease*:

1. *The crime rate has increased from 455 to 656 offenses per 100 000 population.*
2. *The law has increased the Government Employee Bonus calculation rate from 6% to 7%.*
3. *From the summer 1998 to the summer 1999 the speed variation has decreased.*
4. *We have decreased the number of service calls.*

- 1, 3: Change_position_on_a_scale
2, 4: Cause_change__position_on_a_scale

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Type of FE: the lemma *want*

I want [an orange] <= OBJECT_TYPE
I want [to win] <= EVENT_TYPE

Desire frame:

Two sub-frames: one excludes events.
I want your report on my desk tomorrow.

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Frame elements:

- Core
- Non core
- Extrathematic

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The core elements:

- an element that always has to be overtly specified,
- an element which is realized by a core syntactic function (subject, object)
- an element which, when omitted, receives a definite interpretation
- an element with idiosyncratic syntactic marking

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Relations between core elements:

- Coreness sets – one of them represents the whole set, and instantiates it, e.g.

Fred went [from Berkeley]_{source} [across North America and the Atlantic Ocean]_{path} [to Paris]_{goal}

Fred went [across North America and the Atlantic Ocean]_{path} [to Paris]_{goal}

Fred went [to Paris]_{goal}

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Requires/excludes:

The robbers tied [Paul]_{item} to his [chair]_{goal}

**The robbers tied [Paul]_{item}*

The robbers tied [his ankles]_{items} together

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Non-core elements:

Others: time, place, manner, etc. usually associated with situations

Listed in frames

Extrathematic elements

Appear in sentences and invoke other frames, e.g. cause, purpose, reason, etc.

Not listed in frames.

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Frame-elements' names:

Frame specific, e.g. Perceiver_active, Perceiver_passive in the two Perception frames

Very general, e.g. Agent, Sentient being, etc.

There is a project to organize some kind of ontology of FE.

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An extra-thematic element:

The nurse observed the operation, because she was trying to get to a medical school.

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Relations between frames:

SubFrames in Complex Frames, e.g.

Criminal_process frame:

A Suspect is arrested by an Authority on certain Charges, then is arraigned as Defendant. If at any time the Defendant pleads guilty, the Defendant is sentenced, otherwise the Defendant first goes to trial. If the Verdict after the trial is guilty, then the Defendant is sentenced. In the end, the Defendant is either released or is given Sentence by a Judge at the Sentencing

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SubFrames:

Arrest

Arraignment

Trial

Sentencing

Related to Criminal_process and between themselves (by ordering)

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The Trial frame has further subframes, including

- court appearances,
- opening arguments,
- presentation of evidence and testimony
- closing arguments

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Relations between frames:

- Frame inheritance
- See also
- Using
- Causative_of
- Inchoative_of

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Frame Inheritance:

Parent frame -> child frame

All the frame elements, subframes, semantic types of the Parent frame have equally or more specific correspondents in the Child frame

e.g.

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Inheritance:

Parent frame: Perception (*see, hear*)

Child frame: Perception_active (*watch, listen*)

Frame:	Perception	Perception_active
FEs:	Ground	Ground
	Perceiver	Perceiver_agentive
	Phenomenon	Phenomenon

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See also:

Informal grouping of frames that are similar and should be carefully compared and contrasted, e.g.

Seeking
Scrutiny

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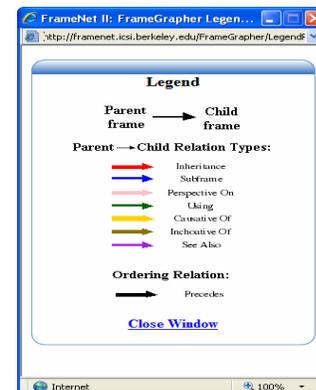
Using:

Commercial_transaction (an exchange of multiple Themes (the Money, the Goods) between the Buyer and the Seller)

Uses: Goods_transaction,
Money_transaction

Buying uses: Goods_transactions

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Non-verbal lemmas:
nouns and support verbs:

Frame-evoking nouns:
event_type: *withdrawal, replacement, operation*
relation_type: *mother, brother, girl-friend*
artifact_type: *house, vest.*

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Support verbs:
„those verbs that combine with a state noun or an event noun to create a verbal predicate, allowing arguments of the verb to fill the slots of the frame elements of the noun”
John and I had a terrible argument last night [conversation_frame]
John made a convincing argument [reasoning frame]

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Some event_nouns take several support verbs, perspectivizing the event:
The surgeon performed an operation on John.
John underwent an operation.
Not all verbs that combine with event-nouns are support verbs:
The nurse observed the operation.

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Adjectives, adverbs, pronouns as targets:
Phil is happy that he passed
Phil is eager to finish
Phil is busy writing
Phil is curious about the new student
Phil is not in the least dissapointed

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Adverbs:
• Alternating with adjectival evocation:
Bill wisely sold the piano || Bill was wise to sold the piano
Dillon was happy to carry the load || Dillon happily carried the load

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• Expressing speakers' attitudes:
Frankly, my dear, I don't give a damn
Honestly, I find it very disturbing
In this case, Bayesian methods quickly reassure us that Pope is probably not an alien.
An individual presumably fabricated a message purporting to be from me
There are many herbal weight-loss supplements on the market today, and they utilize different mechanisms to reportedly aid in dieting

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Back to Frame semantics

Negation:

Her father doesn't have any teeth.

Her husband doesn't have any walnut shells.

Your drawing of the teacher has no nose.

Your drawing of the teacher has no noses.

The statue's left foot has no toe.

The statue's left foot has no toes.

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Back to Frame semantics

- Context-free negation:

Her father doesn't have any teeth.

- Context-dependent negation:
Her husband doesn't have any walnut shells.

- Frame-matching negation:

Your drawing of the teacher has no nose.

Your drawing of the teacher has no noses.

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Back to Frame semantics

generous ⇔ stingy [Frame: sharing is good]

wasteful ⇔ thrifty [Frame: prudence is good]

<---spending-----

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Back to Frame semantics

Within_frame negation (frame accepting)

John isn't stingy

[You are wrong about John]: John isn't stingy; he's really quite generous.

John isn't thrifty

Your impression about John is wrong]: He isn't thrifty; he's actually quite careless with his money

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Cross-frame negation (frame-rejecting)

John isn't being thrifty; he's just downright stingy

John isn't stingy; it's just that he's thrifty

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The negation blocks the natural conclusions that might be drawn from the associated positive sentence:

He didn't lose his little finger; they removed his whole arm.

(Wilson 1972)

'You would not be saying something both true and cooperative if you said „p”

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Acceptable negations of sentences that meet truth conditions:

*I don't **think** I'm right; I **know** I'm right.
You didn't **spare** me a day at the sea-side;
you **deprived** me of one.*

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Back to Frame semantics

Presuppositions:

In the ordinary course of event

Some sentences contain both the pose (a) and presuppose (b) something:

*John regretted signing the letter
(a) John felt bad about signing the letter
(b) John signed the letter*

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Back to Frame semantics

*John doesn't realize who you are
(a) John lacks full knowledge of your identity
(b) Knowledge about your identity could be important to John*

*Did Billy hit Susie again (at t)?
(a) Did Billy hit Susie (at t)?
(b) Billy hit Susie at least once (earlier than t)*

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*Fred stopped running (at t)
(a) Fred was not running (after t)
(b) Fred had been running (before t)*

*I poured myself another cup of coffee (at t)
(a) I poured myself a cup of coffee (at t)
(b) I had already have some coffee (before t)*

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If she had taken the medicine (by t), she would have survived.

*(a) Her taking medicine results in her surviving
(b) She didn't take the medicine before t.*

*He pretended to be an admiral (at t)
(a) He behaved in a way that would encourage people to believe he was an admiral
(b) He believed (at t) that he was not an admiral*

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Back to Frame semantics

Both of John's children are a burden to him

*(a) Two people who are children of John's are a burden to him
(b) John has just two children.*

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What the sentences presupposed is not suspended subject to conditionality, interrogation, negation.

Straightforward third party challenges are heard as challenging what is posed, e.g.

A: *Does she realize who I am?*

B: *I don't think so.*

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Back to Frame semantics

Dealing with such sentences

Presuppositions vs. Entailments:

Presuppositionist view:

Sentences with false presuppositions have no true value.

John didn't pretend to be an admiral (when he is an admiral) has not truth value

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The entailment view:

Presuppositions don't exist. Both what is posed, and what is presupposed, are entailments.

John didn't pretend to be an admiral (when he is an admiral)

negates a false statement 'John's not an admiral' and thus is true

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Back to Frame semantics

If presuppositionist' approach is right, why in some situations it's perfectly all right to use such sentences?

If entailment-instead-of-presupposition approach is right, why are these sentences much more bizarre than the others?

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Frame semantics says:

Words like *regret*, *another*, *again* and others evoke frames dealing with previous events – that's their main function

Words like *pretend* deal with non-truths

Their respective frames have appropriate FE

Denials of such verbs deny what is posed.

However, if the presuppositions are known to be false the negative sentence can be used to deny the applicability of the frame.

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