

The role of context in disambiguating -er nominalizations

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The problem: Polysemy

Deverbal *-er* nominalizations can have a number of readings (Rappaport Hovav & Levin, 1992; Lieber, 2004; Lieber & Andreou, 2018, a.o.)

- ▶ Agent: *writer*
- ▶ Experiencer: *hearer*
- ▶ Instrument: *computer*
- ▶ Location: *diner*
- ▶ Theme: *loaner*

How can we disambiguate the readings of deverbal *-er* nominalizations?

This talk

- ▶ We focus on *-er* nominalizations that are based on verbs related to cooking (e.g. *fryer*).
- ▶ We use Frame Semantics and propose a compositional theory of how *-er* nominals fix their referent in context.
- ▶ Not a full account of meaning of *-er* nominals yet!
- ▶ Case study in how the choice of referents can be constrained by type information from the surrounding context.

Data

- ▶ Example of a cooking verb that gets a patient nominalization is *chop* and *chopper*
- ▶ (1) And today's fancy big portobellos used to be known as 'CHOPPERS' or 'No. 2's'—they were sold wholesale for 25 cents a pound. (Lieber & Andreou, 2018, p. 194)
- ▶ Formalization is still a desideratum of this account.

Data: Why cooking verbs?

- (2) That guide was a proper, very in depth, training guide on how to fry food, so rather than having a de-skilled work force, they have very well trained **fryers** to fry their food... (Google)
- (3) For a machine as elaborate and well-thought-out as this **fryer**, the thermometer was a disappointment. (COCA)
- (4) What a wonderful fresh chicken!! [...] I think he looks great and will be a delicious **fryer**. (Google)

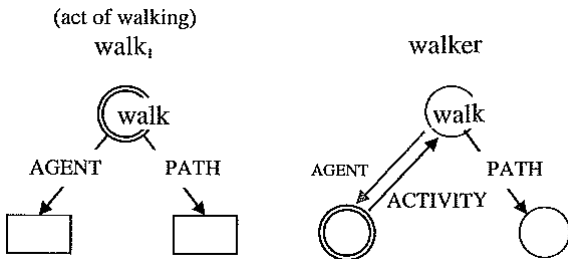
AIM: Identification and modeling of contextual cues that allow *-er* nominals fix their referent in context.

Frame Semantics

- ▶ A frame is a recursive attribute–value structure (Löbner, 2014; Petersen, 2007)
- ▶ Attributes are defined so that, for the attribute holder, there is a single value for that attribute.
- ▶ Values are typed in a typed feature structure (Carpenter, 1992).
- ▶ Values may also have attributes, making frames recursive.

Frame Semantics and Word Formation

- ▶ Word formation in Frame Semantics is generally treated in terms of referential shifts (Andreou & Petitjean, 2017; Löbner, 2013; Kawaletz & Plag, 2015; Plag et al., 2018)
- ▶ Reference is shifted from the original referent to a new referent.
- ▶ e.g. *walk*, *walker* (Löbner, 2013, p. 312)



Event structure

- ▶ Kallmeyer & Osswald (2014) propose a basic frame for a change of state verb.
- ▶ Based on event structure templates of Rappaport Hovav & Levin (1998).
- ▶ We modify this template by also including an INSTR (instrument) as a participant in the activity.

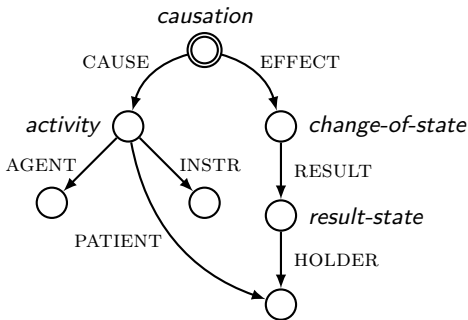


Figure: Frame for change of state verb

Fry frame

- ▶ Fry frame builds on CoS verb frame.
- ▶ Specifies additional type information at various nodes.
- ▶ Type information for participant nodes particularly important.

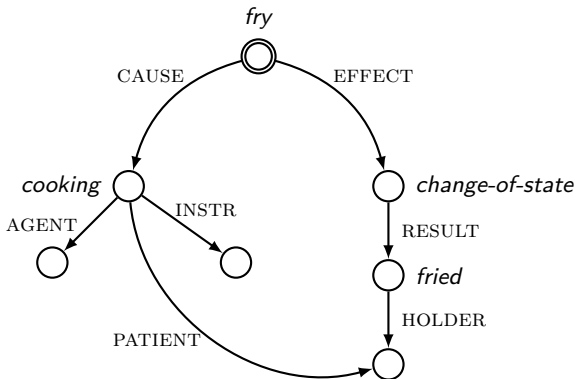
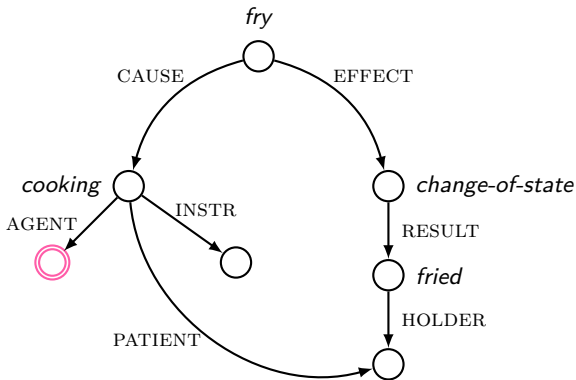
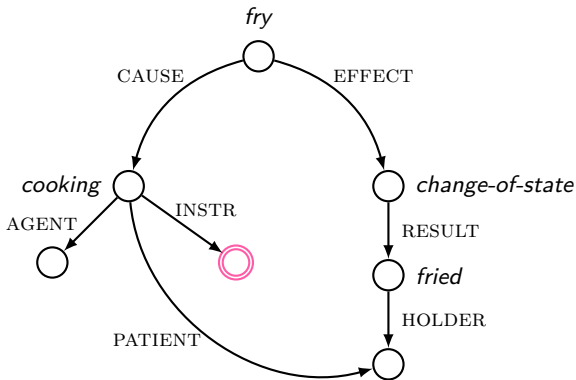


Figure: Frame for *fry*

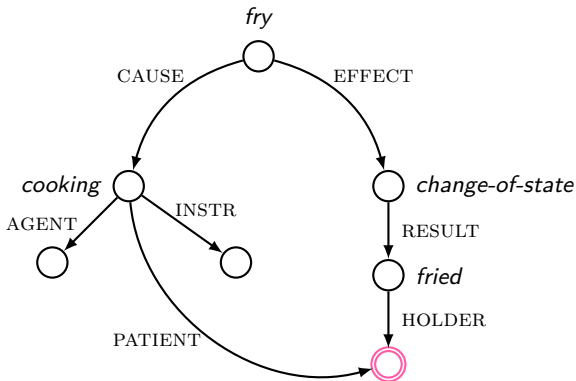
Possibilities for referential shifts: Agent



Possibilities for referential shifts: Instrument

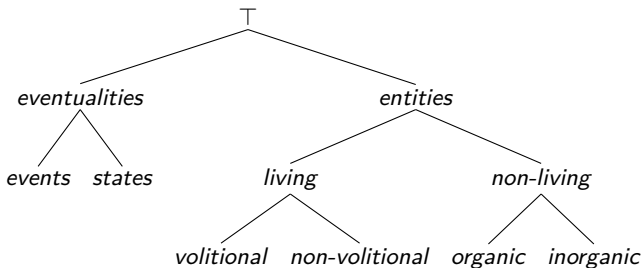


Possibilities for referential shifts: Patient



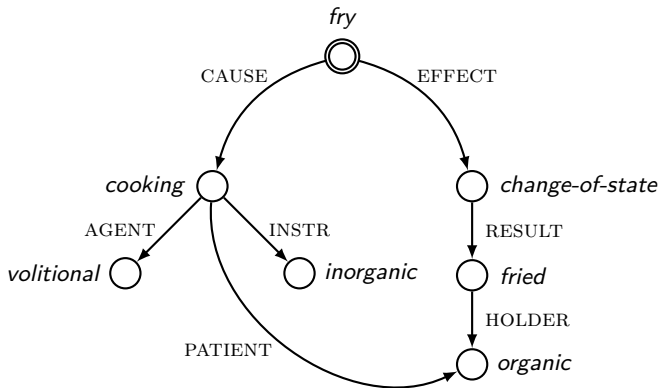
Type hierarchy

- ▶ Values within a frame are typed within a type-feature hierarchy.
- ▶ More specific types entail membership in less specific types.
- ▶ Typing constrains the possibilities for unification of frames.



Fry frame w/ types

- ▶ Fry frame builds on CoS verb frame.
- ▶ Specifies additional type information at various nodes.
- ▶ Type information for participant nodes particularly important.



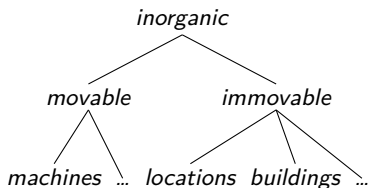
Nominal structure

- ▶ Concepts corresponding to nominals also have articulated frame structure.
- ▶ We will propose (minimal) frames for relevant nouns as we introduce case studies.
 - ▶ Instrument
 - ▶ Agent
 - ▶ Patient

Instrument interpretation

(5) For a machine as elaborate and well-thought-out as this **fryer**, the thermometer was a disappointment. (COCA)

- ▶ Context overtly introduces the *machine* frame.
- ▶ Characterizing information about machines is that they are non-living, non-organic movable objects.
- ▶ Within the type hierarchy, form a subtype of *inorganic*.



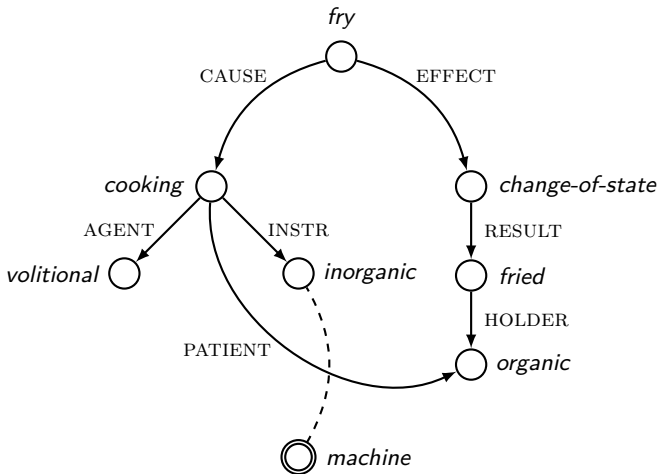
Frame composition: unification

- ▶ Frame composition occurs through unification.
- ▶ Identification of nodes within a frame.
- ▶ A frame can unify another if it has an compatible frame geometry with types that are at least as specific.
- ▶ Any licit unification is considered in the course of frame composition; therefore, theories must show how certain readings are ruled out (e.g., not licit unifications).

Machine frame

- (3) For a machine as elaborate and well-thought-out as this **fryer**, the thermometer was a disappointment. (COCA)
- ▶ Sentential content identifies the referent of *fryer* with a machine.
 - ▶ Choice of referential node dependent on the typing of machine.
 - ▶ Only possibility is the Instrument node.

Unification of *fry* and *machine* frames

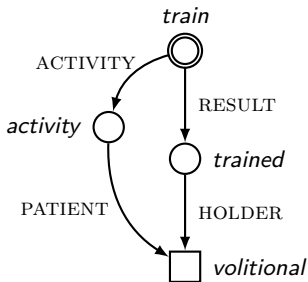


Agent interpretation

- (2) That guide was a proper, very in depth, training guide on how to fry food, so rather than having a de-skilled work force, they have very well trained **fryers** to fry their food... (Google)
- ▶ Several cues for how to fix the referent of *fry*.
 - ▶ Biggest clue: selectional requirements of *well-trained*.
 - ▶ Contrast with *de-skilled workforce* also provides a clue.

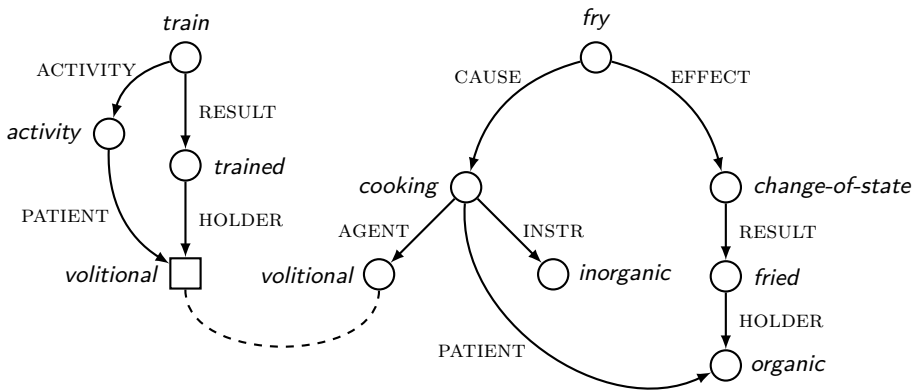
Train(ing) frame

- ▶ Adjective *well-trained* derives from the verbal *train* frame, which has as its *trainee* argument a person.
- ▶ *Well-trained* thus requires a *volitional* argument.
- ▶ Likewise, the members of a workforce are also humans, thus also *volitional*.



Unification of *train* and *fry*

- Unification of the argument node of *well-trained* with *fryer* only possibility in context.
- Referential shift to AGENT node of *fry*.

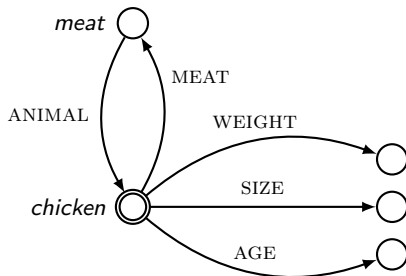


Patient interpretation

- (4) What a wonderful fresh chicken!! [...] I think he looks great and will be a delicious **fryer**. (Google)
- ▶ Exclamative construction introduces a discourse referent for a chicken.
 - ▶ DR is picked up by *he*.
 - ▶ Slight complication: meat of the chicken and not the animal is the (semantic) argument of *fry*.

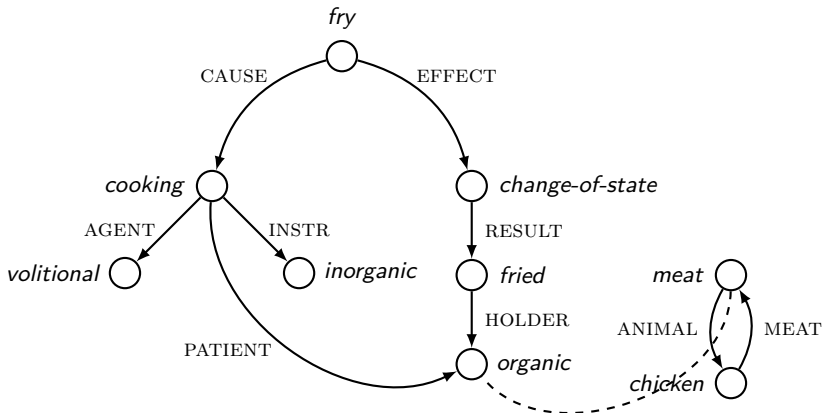
Animal/Food frame

- ▶ Many frames for animals include attributes to their (edible) meat.
 - ▶ Polysemy between animal and food (e.g., chicken and chicken meat)
 - ▶ Animals and their meat have a place within the type hierarchy.
- (6) a. *chicken* \sqsubseteq *non-volitional*
b. *meat* \sqsubseteq *organic*



Unification of *fry* and *chicken*

- Unification of *chicken* frame and *fry* is primarily licit with identification of the MEAT node with the PATIENT, due to type compatibility.



Properties of the individual

- ▶ *Roaster, fryer, and griller* form a kind of culinary paradigm.
- ▶ Preferred cooking methods with different size chickens.
- ▶ Need to model suitability of different chickens for particular events.

Get to Know Your Chickens

- **Broilers:** Chickens 6 to 8 weeks old and weighing about 2 1/2 pounds
- **Fryers:** Chickens 6 to 8 weeks old and weighing 2 1/2 to 3 1/2 pounds
- **Roasters:** Chickens less than 8 months old and weighing 3 1/2 to 5 pounds

Source: <http://www.thekitchn.com/whats-the-difference-between-broiler-fryer-roaster-and-other-types-of-chickens-ingredient-intelligence-47323>

Dispositions and nominalizations

- ▶ Widely recognized that *-er* nominalizations allow for interpretations that only commit the referent to possible participation in an event (Lieber & Andreou, 2018, a.o.).
- ▶ This modality also plays a role in fixing the referent of the nominalization as well.
- ▶ Sketch a proposal for how this might be done in frame semantics.

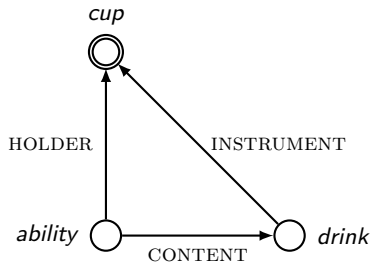
Dispositions as stative predicates

- ▶ Busa (1996): some nominals such as *teacher* and *violinist* make reference to an *ability* state.
- ▶ *Violinist*: *ability* relation between states, individuals, and events of playing the violin encoded in its AGENTIVE quale.
- ▶ Violinist is defined as someone with the ability to play the violin. Representation does not commit speaker to actual events of violin playing.

$$\left[\begin{array}{l}
 \mathbf{violinist} \\
 \mathbf{ARGSTR} = \left[\mathbf{ARG1} = \mathbf{x:human} \right] \\
 \mathbf{EVENSTR} = \left[\begin{array}{l}
 \mathbf{D-E1} = \mathbf{e_1:process} \\
 \mathbf{D-E2} = \mathbf{e_2:state} \\
 \mathbf{REST} = \mathbf{e_2 <_{\alpha} e_1}
 \end{array} \right] \\
 \mathbf{QUALIA} = \left[\begin{array}{l}
 \mathbf{FORMAL} = \mathbf{x} \\
 \mathbf{TELIC} = \boxed{1} = \mathbf{play(e_1, x, violin)} \\
 \mathbf{AGENTIVE} = \mathbf{ability(e_2, x, \boxed{1})}
 \end{array} \right]
 \end{array} \right]$$

Modal interpretations of *-er* nominals

- ▶ Adapt Busa (1996)'s insight and treat the modality as a state.
- ▶ Abilities can be modeled as states of *ability*, relating an individual to an event.
- ▶ **CONTENT** attribute value is constrained to types of events (such as *drink* events for cups).



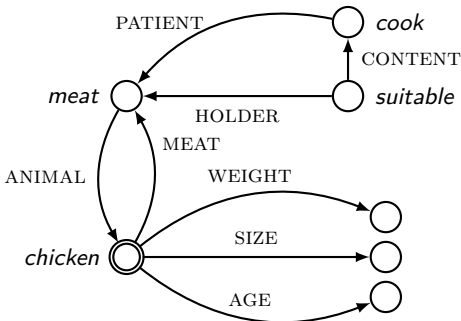
Modal interpretations

- ▶ Different interpretations of arguments of *-er* nominals show that modality cannot be reduced to mere habituality.
- ▶ Will need other modal states besides *ability*, such as *habit* (cf. Busa) and *suitable* (more in a moment).
- ▶ Related proposal found in Anderson & Löbner 2018, who make use of an event **preside** in the lexical semantics of nouns like *president*.

$$(7) \quad \llbracket \textit{president}_{\textit{person}} \rrbracket = \lambda o \lambda t \lambda i [i = \text{INC}(\text{HEAD}(\iota e. \mathbf{preside}(e) \wedge \tau(e) = t \wedge \text{ORG}(e) = o))]$$

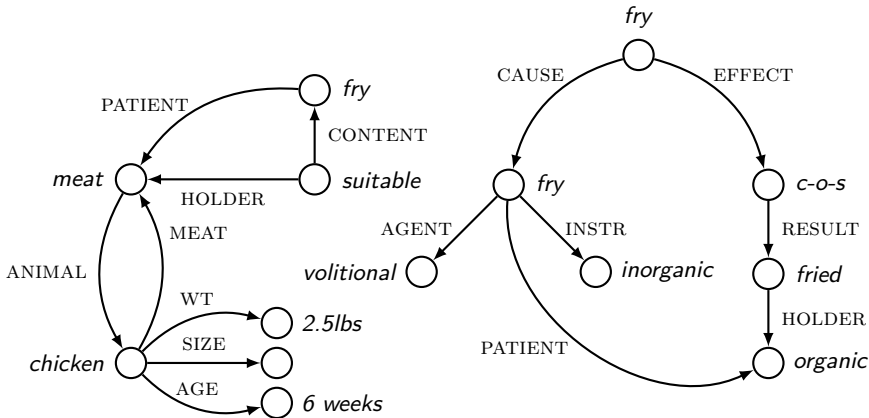
Extending *chicken*

- ▶ Extend the *chicken* frame in order to include a modal component *suitable* (suitability).
 - ▶ A fryer is a chicken that (has meat that is) good for frying.
 - ▶ A chopper is a mushroom that is well suited to being chopped up
- ▶ Frame encodes correlations between size/weight/age of chicken and content of the modal state. (See also Barsalou 1992 for correlations between attributes.)
- ▶ In context, any particular chicken will have the content of its modal state valued for a particular event type (e.g., *fry*).



Unification of *chicken* and *fry*

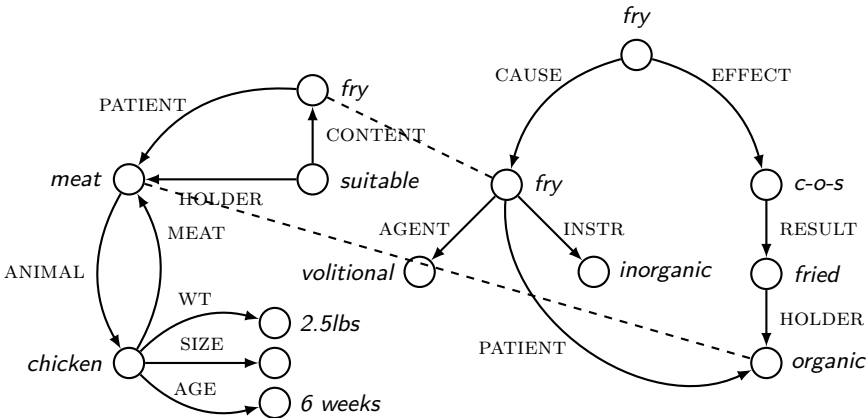
- ▶ Similar frame geometry. The subframe $fry \xrightarrow{\text{PATIENT}} meat$ is a more specific frame than $fry \xrightarrow{\text{PATIENT}} organic$, thus unification is possible.



- ▶ First pass at modeling this particular “suitability” interpretation of Patient nominals.

Unification of *chicken* and *fry*

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Conclusion

- ▶ Showed how referential shifts with *-er* nominalizations can start to be accounted for within Frame Theory.
- ▶ Sketched how information from the sentential and discourse context can constrain the interpretation of the nominalization, e.g. fix the referential node.
- ▶ Highlighted the importance of the type hierarchy in constraining the readings available with frame composition and reference shifts.

Thank you!

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