The role of context in disambiguating -er nominalizations

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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.
Example of a cooking verb that gets a patient nominalization is *chop* and *chopper*

(1) And today’s fancy big portabellos 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.
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.
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.

![Diagram](https://example.com/diagram.png)

*Figure: Frame for change of state verb*
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

The diagram illustrates the frame semantics of the verb "fry". The frame structure includes:

- **AGENT**: The one causing the action of frying.
- **CAUSE**: The action of frying.
- **INSTR**: The instrument or method used for frying.
- **PATIENT**: The item or entity being fried.
- **RESULT**: The state of being fried.
- **HOLDER**: The entity holding the fried item.

The diagram shows the relationships between these elements, with arrows indicating the direction and type of relationship (e.g., cause, effect, instrument).
Possibilities for referential shifts: Instrument

- Frame Semantics
  - Event structure and types
  - Case studies
  - Extension: Modality
  - Conclusion

Diagram:
- **fry**
  - CAUSE
  - EFFECT
- **cooking**
  - INSTR
  - AGENT
  - PATIENT
- **change-of-state**
  - RESULT
  - HOLDER
- **fried**
Possibilities for referential shifts: Patient

- fry
  - CAUSE
  - INSTR
  - PATIENT
- cooking
  - AGENT
  - INSTR
- change-of-state
  - RESULT
  - HOLDER
- fried
- 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.

```
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Entity hierarchy

- T
  - eventualities
    - events
    - states
  - entities
    - living
      - volitional
      - non-volitional
    - non-living
      - organic
      - inorganic
```
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.

![Fry frame diagram]

- Frame w/ types
- Fry frame builds on CoS verb frame.
- Specifies additional type information at various nodes.
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**Fry frame diagram**

- **fry**
- **cooking**
- **change-of-state**
- **volitional**
- **inorganic**
- **fried**
- **organic**

**Nodes:**

- **AGENT**
- **INSTR**
- **RESULT**
- **HOLDER**
- **CAUSE**
- **EFFECT**
- **PATIENT**
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
(5) For a machine as elaborate and well-thought-out as this fryer, the thermometer was a disappointment.

- 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.

```
inorganic
  └── movable
      └── immovable
          └── machines
              └── locations
                  └── buildings
```
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).
(3) For a machine as elaborate and well-thought-out as this *fryer*, the thermometer was a disappointment.  

▶ 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

Diagram:
- Fry frame:
  - **CAUSE**
  - **EFFECT**
  - **AGENT**
  - **INSTR**
  - **PATIENT**
- Cooking frame:
  - **change-of-state**
  - **RESULT**
  - **HOLDER**
  - **inorganic**
  - **volitional**
- Organic frame:
  - **organic**
- Machine frame:
  - **machine**
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 workforce, they have very well trained fryers to fry their food...

- 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.
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*.

![Diagram showing unification of train and fry](Diagram.png)
(4) What a wonderful fresh chicken!! [...] I think he looks great and will be a delicious fryer.

- 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.
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* ⊆ *non-volitional*
    b. *meat* ⊆ *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.

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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

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.

\[
\text{\textbf{violinist}} \\
\text{ARGSTR = } \begin{bmatrix}
\text{ARG1 = x:human} \\
\text{D-E1 = e1:process} \\
\text{D-E2 = e2:state} \\
\text{REST = e2} < \alpha e1
\end{bmatrix} \\
\text{EVENSTR = } \begin{bmatrix}
\text{FORMAL = x} \\
\text{TELIC = 1 = play(e1, x, violin)} \\
\text{AGENTIVE = ability(e2, x, 1)}
\end{bmatrix}
\]
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).
Different interpretations of arguments of \textit{-er} nominals show that modality cannot be reduced to mere habituality.

Will need other modal states besides \textit{ability}, such as \textit{habit} (cf. Busa) and \textit{suitable} (more in a moment).

Related proposal found in Anderson & Löbner 2018, who make use of an event \textit{preside} in the lexical semantics of nouns like \textit{president}.

\[
\left[ \textit{president}_{\text{person}} \right] = \lambda o \lambda t \lambda i [i = \text{INC}(\text{HEAD}(\text{\textit{preside}(e)} \wedge \tau(e) = t \wedge \text{ORG}(e) = o))]
\]
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 $\textit{fry} \xrightarrow{\text{PATIENT}} \textit{meat}$ is a more specific frame than $\textit{fry} \xrightarrow{\text{PATIENT}} \textit{organic}$, thus unification is possible.

- First pass at modeling this particular “suitability” interpretation of Patient nominals.
Unification of *chicken* and *fry*

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

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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.
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