Lexicon in Linguistic Theory

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Lecture 3: Lexicon in Semantic Frameworks

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Lecture 3: July 1

Lexicon in Semantic Frameworks

- Basic semantic concepts and relation between lexicon and semantics
- Formal Semantics
- Conceptual Semantics
- Cognitive Linguistics
- Prototype theory
What is a lexical item?

Chomsky (1993)

By a **lexical item** I mean nothing more than a feature complex, and there are some feature complexes without much content, for example AGR, which you mention, which I suppose is just a collection of phi-features. Tense on the other hand has at least some semantic content - though it’s not entirely obvious that this is true of the Tense position as well as the feature on the verb that ends up matching it. About the status of more complex words, and morphology generally, I think there are a lot of murky areas, and am not trying to stake out a clear position just yet.
Basic semantic concepts

- **Semantics**: study of meaning; one of the cognitive modules of natural language grammar.
- **Lexical semantics**: study of the meaning of words and the semantic relations that exist between them.
- **Sentential/phrasal semantics**: study of the meaning conveyed by complex linguistic expressions.
- **Reference/denotation**: link between a linguistic expression and the thing, property or situation in the real world it alludes to.
  - **Referent**: the actual thing a linguistic expression refers to.
- **Sense**: link between a linguistic expression and the concept it represents.
- Most linguistic expressions have a meaning composed of both a sense (*intension*) and a reference (*extension*). → **Rich denotational approach to meaning** (sec. 4.3.3.)
  - **Just reference**: *the sun, David Bowie*
  - **Just sense**: *freedom, lucky, jedi*
Relationship between lexicon and semantics: core issues

1. Is lexical meaning atomic or can it be decomposed into smaller elements?

2. If it can be decomposed, what would be its smallest elements (i.e., the *primitives*) and how can they be formalized?

3. Is the nature of these minimal meaning components strictly linguistic (belonging exclusively to ‘lexical knowledge’) or rather conceptual (belonging to a more general ‘commonsense knowledge’)?
Main tenets of formal semantics

- Natural language semantics is modeled as a formal logic system (as in Generative Grammar).
- **Referential/denotational/extensional** approach to meaning: it is defined with respect to specific referents in a model rather than through their *sense* (the represented concept and its specific features).
- All the complexities stemming from human perception and usage are ignored (the speaker is not in the picture).
- Focus on sentence meaning and how it is derived compositionally rather than on word meaning.
- Focus on the meaning of functional categories involved in sentence construction (quantifiers, conjunction, negation words, etc.).
Predicate calculus

- First-order logic, where we can mention and quantify first-order individuals (things)
- Stages of interpretation of linguistic expressions:
  - Natural language expressions are translated in first-order logic (FOL) fragments;
  - The sentence is translated into a FOL formula
  - The FOL expressions and the formula are interpreted in a model (simplified representation of real-world situations);
  - The formula is judged as true or false.
Components of first-order expressions

- **Vocabulary (lexicon)**
  - Individual constants representing specific objects: $a$, $b$, $c$, etc.
  - Individual variables: $x$, $y$, $z$, etc.
  - Predicate symbols: $A$, $B$, $R$, etc.
  - Logical connectives: $\neg$ (not), $\land$ (and), $\lor$ (or), $\rightarrow$ (if ... then), $\leftrightarrow$ (if and only if).
  - Quantifiers: $\forall$ (universal quantifier ‘every’), $\exists$ (existential quantifier ‘some’).

- **Combination rules:**
  - If $A$ is an $n$-place predicate and $t_1 \ldots t_n$ are terms, then $A(t_1 \ldots t_n)$ is a formula.
  - If $\phi$ is a formula, then $\neg \phi$ is a formula.
  - If $\phi$ and $\psi$ are formulas, then $(\phi \land \psi)$, $(\phi \lor \psi)$, $(\phi \rightarrow \psi)$, and $(\phi \leftrightarrow \psi)$ are formulas.
  - If $\phi$ is a formula and $x$ is a variable, then $\forall x \phi$ and $\exists x \phi$ are formulas.
Predicate calculus: an example

Natural language sentences

a. Chewbacca is a Wookie.  
 b. Chewbacca protects Han Solo.  
 c. Chewbacca is hairy.  
 d. Han Solo is not hairy.  
 e. Someone is hairy.  
 f. All Wookies are hairy.

Vocabulary

- **Individuals**: Chewbacca: \( c \), Han Solo: \( h \), Luke: \( l \)
- **Predicates**: is a Wookiee: \( W \), is hairy: \( H \), protects: \( P \), loves: \( L \), speaks English: \( E \)

First-order translation

- a. \( W(c) \)  
- b. \( P(c, h) \)  
- c. \( H(c) \)  
- d. \( \neg H(h) \)  
- e. \( \exists x \ H(x) \)  
- f. \( \forall x \ (W(x) \to H(x)) \)
Predicate calculus: an example

- **Interpretation function** $[[.]]$: a formal link between a linguistic expression and its meaning (in Formal Semantics, its extension)
  - **Assignment function**: $[[.]]$ applied to a variable.

<table>
<thead>
<tr>
<th>Kind of expression</th>
<th>Its extension</th>
</tr>
</thead>
<tbody>
<tr>
<td>Individual constant or variable (proper N)</td>
<td>individual in the model</td>
</tr>
<tr>
<td>Predicate</td>
<td>set of individuals in the model</td>
</tr>
<tr>
<td>Sentence/proposition</td>
<td>truth value in the model</td>
</tr>
</tbody>
</table>

- **Constant interpretation**
  a. $[l] = \text{Luke}$
  b. $[j] = \text{Leia}$
  c. $[d] = \text{Darth Vader}$
  d. $[h] = \text{Han Solo}$
  e. $[c] = \text{Chewbacca}$

- **Predicate interpretation**
  a. $[H] = \text{is hairy} = \{\text{Chewbacca}\}$
  b. $[E] = \text{speaks English} = \{\text{Luke, Leia, Darth Vader, Han Solo}\}$
  c. $[J] = \text{is a jedi} = \{\text{Luke}\}$
  d. $[S] = \text{is a sibling of} = \{\langle\text{Luke, Leia}\rangle, \langle\text{Leia, Luke}\rangle\}$
  e. $[L] = \text{is in love with} = \{\langle\text{Luke, Leia}\rangle, \langle\text{Han Solo, Leia}\rangle, \langle\text{Leia, Han Solo}\rangle\}$
  f. $[P] = \text{prefers} = \{\langle\text{Leia, Han Solo, Luke}\rangle\}$
Predicate calculus: an example

- Proposition interpretation: a proposition is true if its denotation is included in the model and false otherwise.
  a. $E(h) = \text{Han Solo speaks English.}$
  b. $L(l, j) = \text{Luke is in love with Leia.}$
  c. $H(d) = \text{Darth Vader is hairy.}$

  a. $[E(h)]_{M_1} = 1$ because $[h]_{M_1} \in [E]_{M_1}$
  b. $[L(l, j)]_{M_1} = 1$ because $([l]_{M_1}, [j]_{M_1}) \in [L]_{M_1}$
  c. $[H(d)]_{M_1} = 0$ because $[d]_{M_1} \notin [H]_{M_1}$
Meaning postulates

- **Meaning postulate**: specification of some formal association that holds between one term and another, typically consisting of two propositions related by lexical entailment.

- Most **lexical relations** can be accounted for by meaning postulates
  - **Hyponymy**: $\forall x [daisy(x) \rightarrow flower(x)]$
  - **Synonymy**: $\forall x [calm(x) \leftrightarrow serene(x)]$
  - **Opposition or antonymy**: $\forall x [even(x) \rightarrow \neg odd(x)]$
  - **Converseness**: a. $\forall x \forall y [in.front.of(x, y) \rightarrow behind(y, x)]$
    b. $\forall x \forall y [in.front.of(x, y) \rightarrow \neg behind(x, y)]$

- Meaning postulates used to encode lexical-semantic features
  a. $\forall x [daisy(x) \rightarrow inanimate(x)]$
  b. $\forall x [bachelor(x) \rightarrow human(x)]$

- A word is defined **relationally** (by the relations it has with the other words), but no account is provided as to why these relations hold.
Language architecture in Conceptual Semantics

- **Mentalist theory**: focuses on semantics as a conceptualization interface between the world and language users, which can be triggered by direct contact with reality, by memory, by other people’s utterances, or through logical inference.

- **Parallel Architecture**: three generative linguistic systems interconnected through interfaces (Jackendoff 2010):

  ![Diagram of language architecture](image)

  - **Phonological Structure**
  - **Syntactic Structure**
  - **Conceptual Structure**
  - **Spatial Structure**
  - **Haptic System**
  - **Visual System**
  - **Proprioceptive Systems**

  **LANGUAGE PROPER**    **CENTRAL COGNITION**
Words in CS

- Lexical entries include both linguistic and non-linguistic information.
- Words are regarded as constructions varying in size and the degree of fixedness, as in CG.
- They may be fully specified for the three components making up the Parallel Architecture or may lack one of them:

<table>
<thead>
<tr>
<th>LEXICAL ITEM</th>
<th>PHONOLOGY</th>
<th>SEMANTICS</th>
<th>SYNTAX</th>
</tr>
</thead>
<tbody>
<tr>
<td>[lexical word] cat</td>
<td>cat</td>
<td>[Object CAT]</td>
<td>[N; sing; count]</td>
</tr>
<tr>
<td>[interjections] wow, oops, aha</td>
<td>wow, oops, aha</td>
<td>expression of surprise/apology/triumph</td>
<td></td>
</tr>
<tr>
<td>[functional words]</td>
<td>it, of, do</td>
<td></td>
<td>Pronoun, P, V</td>
</tr>
<tr>
<td></td>
<td>it (in It rains), of (in destruction of a temple), do (in Do you remember?)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>[syntactic construction]</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>causative-resultative constr.</td>
<td>X₁ CAUSE [Y₂ BECOME Z₃] MEANS: EVENT₄</td>
<td></td>
</tr>
<tr>
<td>[phrase structure rule]</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>VP → V NP</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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Lexical entry in CS: Spatial Structure

- Represents *non-linguistic perceptual information* related to how we understand the world: typical shape, texture, internal constituency and motion of the objects, and how these may vary in time.
  - The ‘manner-of-motion’ component of motion Vs. Their syntactic and Conceptual structures would be the same, but the Spatial Structure would be different.
- Geometric or topological (rather than logical) representations
- Lexical entry of *cat*

Phonology: /kæt/
Syntax: [N; singular; count]
Conceptual Structure: [Object CAT, TYPE OF ANIMAL, TYPICAL FUNCTION: PET]
Spatial Structure:
Lexical entry in CS: Conceptual Structure

- **Conceptual Structure** embraces all the grammatically relevant aspects of meaning: quantification, predicate-argument structures, taxonomic categorization, temporal and causal relations, etc.
- Logical representations are built up from discrete features and functions.
  - **Conceptual Categories**: Object, Event, State, Action, Place, Path, Property, Sound, Information, Quantity, Manner, etc.
  - **Function-argument pairing**: \([\text{Category } FUNCTION (\text{Arg}_1, \ldots, \text{Arg}_x)]\)
  - Basic spatial use of *to go*: 
    \([\text{Event } GO ([\text{Object } X], [\text{Path } Y])]\)
- *John went into the room*
  - Syntax: 
    \([[\text{John}];_i [\text{went}];_j [\text{into}];_k [\text{the room}];_m]]\)
  - Conceptual Structure: 
    \([\text{Event } GO ([\text{Object } \text{John}];_i, [\text{Path } \text{TO} ([\text{Place } \text{IN} ([\text{Object } \text{room}];_m)])];_k])_j\)
Conceptual Structure: core functions

- **GO**
- **BE and STAY:** static configurations that can be located in time
  - John is at the cinema.
    \[
    \text{State BE (\text{Object John}, \text{Place IN (\text{Object cinema})})}\]
  - John \{stayed/continued\} at home.
    \[
    \text{Event STAY (\text{Object John}, \text{Place IN (\text{Object home})})}\]
- **EXT:** static configuration where different parts of the argument \(x\) occupy different parts of the PATH at the same time
  - The railway goes uphill.
    \[
    \text{State EXT (\text{Object railway}, \text{Path uphill})}\]
- **ORIENT:** static configuration where \(x\) is oriented along the PATH, but it neither moves through the PATH nor occupies it.
  - The telescope points to Venus.
    \[
    \text{State ORIENT (\text{Object telescope}, \text{Path TO (\text{Object Venus})})}\]
Conceptual Structure: aspectual functions

- **INCH**: initiation of states
  - The door opened.
  
  \[
  [\text{Event INCH} ([\text{State BE} ([\text{Object door}], [\text{Place AT} ([\text{Property open}]]))])]
  \]

- **PERF**: culmination of events or states
  - The moon has risen.
  
  \[
  [\text{State PERF} ([\text{Event GO} ([\text{Object moon}], [\text{Path UPWARD}]]))]
  \]
Conceptual Structure: causative functions

- **CAUSE**: the causer makes the patient to undergo the caused event

  - John opened the door.

  $[\text{Event CAUSE ([Object John], [Object door], [Event INCH ([State BE ([Object door] [Place AT ([Property open])])])])}]$
Semantic fields in Conceptual Structure

- The same set of abstract conceptual patterns is applied to many different semantic fields: space, possession, time, property, change, causation, etc.

- BUT: the approach is not localistic: these similarities arise because the conceptual pattern underlying the organization of different semantic domains is the same.

- The book is in the drawer. **Spatial location**
  \[
  \text{[State BE}_{\text{Loc}} \, ([\text{Object book}], \, [\text{Place IN} \, ([\text{Object drawer}]])])
  \]

- The meeting is on Thursday. **Temporal location**
  \[
  \text{[State BE}_{\text{Temp}} \, ([\text{Object meeting}], \, [\text{Place AT} \, ([\text{Object Thursday}]])])
  \]

- The book is John’s. **Possession**
  \[
  \text{[State BE}_{\text{Poss}} \, ([\text{Object book}], \, [\text{Place AT} \, ([\text{Object John}]])])
  \]

- The book is red. **Property**
  \[
  \text{[State BE}_{\text{Ident}} \, ([\text{Object book}], \, [\text{Place AT} \, ([\text{property red}]])])
  \]
Main tenets of Cognitive Linguistics

- Linguistic knowledge is not innately specific or unique: it is just one manifestation of a more general cognitive system, which enables conceptualization, categorization, schematization, etc.

- Specific frameworks within CL: Construction Grammar, Cognitive Grammar, Radical Construction Grammar, etc.

- Representational approach to meaning: meaning is the product of human mind, and it emerges when our body comes into contact with the environment through perception.

- Importance of speaker-conditioned factors: social and cultural variation, linguistic performance and language use (as opposed to competence).
Main tenets of CL regarding the lexicon

- Lexicon is seen as a set constructions.
- Linguistic and general encyclopedic information are not separated.
  - Synonyms *dog*/*hound*: similar conceptual meaning but *dog*: generic term, can have negative connotation (*He smells like a dog*)
  - *hound*: related to the hunting and retrieving activity
Semantic construal

- **Semantic construal**: when describing a situation, the speaker chooses one of the many perspectives associated with the encyclopedic knowledge encoded by a linguistic expression.

  - **Specificity**: level of granularity used to describe an object/activity/attribute in a situation:
    - *Is this a MacBook, laptop, artifact, or thing?*
  
  - **Focusing**: the “viewing frame” that demarcates the conceptual content of an expression.
    - *A finger is part of the hand vs. A finger is part of your body.*
Semantic construal

- **Prominence**: elements we pay most attention to (through *profiling* and *trajector-landmark alignment*). **Trajector** (*figure*): the most prominent participant within the profiled relationship. **Landmark** (*ground*): ‘secondary focus’ participant.
  - *Parent/child*: the same conceptual base, different profilings.
  - *Have a parent/ have a child*: the same conceptual base and profile but different trajector-landmark alignments.

(a) *have a parent*  
(b) *have a child*

- **Perspective**: the vantage point from which we view the situation:
  
(a) *The sofa is in front of the TV*  
(b) *The sofa is behind the TV*
Semantic definition of syntactic categories

- The category for realizing a given concept depends on how it is construed and profiled in context.
- Nouns profile *things*: entities perceived as grouped and reified
  - Interconnected parts of a *laptop*
  - Qualitative identity of different parts and instances of *water*
- Verbs profile *processes*: temporal relationships scanned sequentially.
Semantic definition of syntactic functions (Radical CG)

- Syntactic categories and grammatical relations are defined with respect to their role in a particular construction.
- Semantic constructions we use to structure the elements of a described scene (*propositional act constructions*)
  - **Reference**: what we are talking about
  - **Predication**: what is being said about the referred to entity
  - **Modification**: what we add to the description of the entity
- Prototypical/peripheral syntactic categories in propositional act constructions (Croft 2001)

<table>
<thead>
<tr>
<th>Category</th>
<th>Reference</th>
<th>Modification</th>
<th>Predication</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Objects</strong></td>
<td><strong>Unmarked nouns</strong></td>
<td>genitive (<em>John’s watch</em>), adjectivalizations (<em>childish</em>), PPs on Ns (<em>the car in the yard</em>)</td>
<td>predicate nominals, copulas (<em>This is a dog</em>)</td>
</tr>
<tr>
<td><strong>Properties</strong></td>
<td>deadjectival nouns (<em>sadness, acidity</em>)</td>
<td><strong>Unmarked adjectives</strong></td>
<td>predicate adjectives, copulas (<em>The dog is huge</em>)</td>
</tr>
<tr>
<td><strong>Actions</strong></td>
<td>action nominals (<em>discovery, collection</em>), complements, infinitives, gerunds (<em>Hydrating is healthy</em>)</td>
<td>Participles (<em>the cat lying on the pillow</em>), relative clauses</td>
<td><strong>Unmarked verbs</strong></td>
</tr>
</tbody>
</table>
Classical categorization model and its issues

- **Categorization**: how we group similar (but not identical) objects as belonging to the same class.

- **Classical Aristotelian model of necessary and sufficient conditions.**
  Categories are
  - Discrete: different units are neatly demarcated and do not overlap
  - Defined through a set of necessary and sufficient features: a member of a category must have all and only the features required for this category
  - Have neither “good” nor “bad” members of a category

- **BUT**: lex. fields have meaning gaps/ overlaps/ non-binary features

- **parrot**: bright-colored tropical bird having a strong curved bill and clawed zygodactyl feet.

- Does an entity stop being a parrot if it is
  - an ill-formed or damaged parrot that lost its vivid coloring?
  - a new, genetically modified parrot that has a straight beak?
  - a robot that looks like a parrot and can imitate human speech?
Prototype-based model of categorization

- Rosch (1973): goodness-of-example ratings of concrete categories
- 95% of participants gave the highest score to the same member of the category.

<table>
<thead>
<tr>
<th>Category</th>
<th>Best members GOE</th>
<th>Moderate-fit members GOE</th>
<th>Worst members GOE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Furniture</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>chair</td>
<td>1.04</td>
<td>buffet</td>
<td>2.89</td>
</tr>
<tr>
<td>sofa</td>
<td>1.04</td>
<td>lamp</td>
<td>2.94</td>
</tr>
<tr>
<td>couch</td>
<td>1.10</td>
<td>stool</td>
<td>3.13</td>
</tr>
<tr>
<td>Fruit</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>orange</td>
<td>1.07</td>
<td>lime</td>
<td>2.45</td>
</tr>
<tr>
<td>apple</td>
<td>1.08</td>
<td>tangelo</td>
<td>2.50</td>
</tr>
<tr>
<td>banana</td>
<td>1.15</td>
<td>papaya</td>
<td>2.58</td>
</tr>
<tr>
<td>Bird</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>robin</td>
<td>1.02</td>
<td>hawk</td>
<td>1.99</td>
</tr>
<tr>
<td>sparrow</td>
<td>1.18</td>
<td>raven</td>
<td>2.01</td>
</tr>
<tr>
<td>bluejay</td>
<td>1.29</td>
<td>goldfinch</td>
<td>2.06</td>
</tr>
<tr>
<td>Sport</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>football</td>
<td>1.03</td>
<td>ice skating</td>
<td>2.29</td>
</tr>
<tr>
<td>baseball</td>
<td>1.05</td>
<td>jai alai</td>
<td>2.30</td>
</tr>
<tr>
<td>basketball</td>
<td>1.12</td>
<td>skating</td>
<td>2.39</td>
</tr>
</tbody>
</table>
Prototype-based model of categorization

- Category membership can be a matter of degree: some members are better representatives of the category than others.
- In some categories, the boundaries are fuzzy rather than clear-cut, but the central part of the category is clear: speakers easily identify the central members can’t always say if something belongs to the category or not.

Different interpretations of *prototype*:

- **Typical example**: the most prominent member of the category (with highest GOE): *apple/orange* for FRUIT.
- **Salient examples**: salient (familiar, memorable) examples that we have previously encountered, e.g., the building we grew up in as the prototype of HOUSE.
- **Set of prototypical features**: the member that has all or most of the features that define the category.
Prototype-based model of categorization

- Different interpretations of *prototype*:
  - **Family resemblance** in categories whose members share no/few elements, but where each member has at least one element in common with at least one other member (AB-BC-CD-DE) (Rosch and Mervis 1975).
  - **Fruit** category: the most typical fruit has the greatest number of features and the least typical (olive) just one.

<table>
<thead>
<tr>
<th></th>
<th>orange</th>
<th>banana</th>
<th>grapefruit</th>
<th>pineapple</th>
<th>tomato</th>
<th>olive</th>
</tr>
</thead>
<tbody>
<tr>
<td>grows on a tree or a bush</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>-</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>is juicy</td>
<td>+</td>
<td>-</td>
<td>+</td>
<td>-</td>
<td>+</td>
<td>-</td>
</tr>
<tr>
<td>is sweet</td>
<td>+</td>
<td>+</td>
<td>-</td>
<td>+</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>the edible part is brightly colored</td>
<td>+</td>
<td>-</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>-</td>
</tr>
<tr>
<td>is used for desert</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

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Lexicon in Linguistic Theory
Basic level category

- **Basic level categories** are the ‘vertical’ or ‘taxonomic’ manifestation of the prototype effect.

  a. animal > mammal > **dog** > German shepherd
  b. vehicle > **car** > sports car
  c. furniture > **chair** > kitchen chair
Basic level category

- Basic level categories are information-rich and therefore easily distinguishable: their members have many attributes in common and share very few attributes with the members of other categories of the same taxonomic level.

- Characteristic properties of basic level categories and the words denoting them:
  - Similarity in shape and overall look.
  - Similarity of sensory-motor interaction with the objects.
  - Early language acquisition: basic categories are the first ones to be categorized and named.
  - Morphological simplicity: chair vs. furniture (from French fournit ‘act of furnishing’, derived from fournire ‘to furnish’) vs. kitchen chair.
Further implications for lexical semantics

1 Prototypicality and word meaning: word meanings can have fuzzy boundaries, and prototypicality accounts for semantic flexibility and for the fact that words are used to describe things that may not be directly related to their central meaning.

2 Prototype effects in word definition:
   a. *bird*: an animal that lays eggs [*always*] and has wings [*!moas*] and a body covered with feathers [*kiwis/penguins: unusual feathers*].
   b. *fruit*: a usually soft and juicy plant part (as rhubarb, a strawberry, or an orange) that is often eaten as a dessert.

3 Polysemy in terms of radial categories: words have a basic sense, and other senses related to the basic one and to one another.

   *fruit* (Geeraerts 2010): metaphor link (a)-(d/e); generalization (a)-(b/c):
   a. being sweet, juicy, commonly used as dessert (apples, oranges, etc.)
   b. being the seed-bearing part of a plant
   c. being the edible result of a vegetable process (‘fruits of the earth’)
   d. being the positive outcome of a process or activity (advantage, profit)
   e. being the outcome of a process or activity


