Cascades, TTs, and dot types

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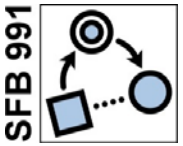

HEINRICH HEINE
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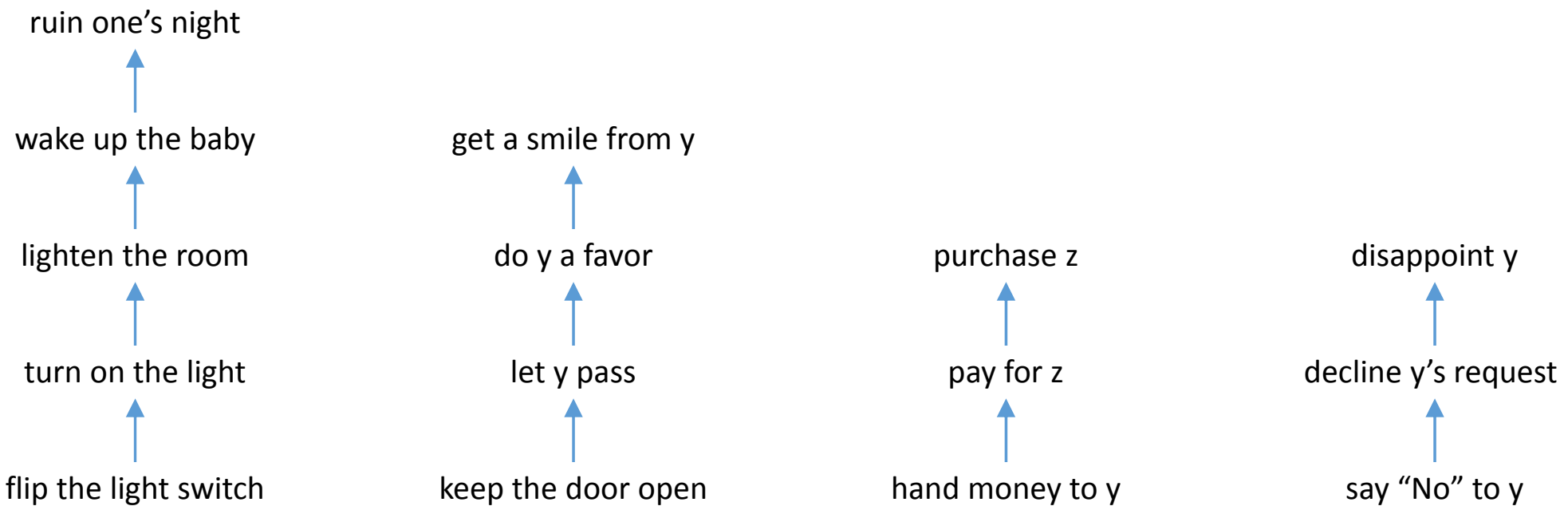
1. Act-cascades revisited

1.1 Multi-level categorization of action: examples



1.2 Act-tokens, act-types, act-TTs

An **act-token** is an instantiation of an **act-type.**

Example: Amy's opening the door at 2:03 p.m. is a token of the act-type 'open the door'.

An act-type can have an open number of act-tokens.

Act-tokens are located in time and space and have a particular agent.

An **act-TT** is a token a of an act-type A. Notation: **a/A.**

- **Act-TTs** are categorized act-tokens.
- Whenever we verbally refer to an act, we refer to an act**-TT**:
  no reference without some kind of categorizing description
- Whenever we think of an act, we think of an act**-TT**.

In general 'x/Y' stands for : "entity-x-under-the-type-description-Y"

1.3 C-constitution

Definition (informal) [Based on the notion of "level-generation" in Goldman (1970)]
Let a1/A1 and a2/A2 be act-TTs with the same agent and the same action time.
Under circumstances C, an act-TT a1/A1 **c-constitutes ("level-generates")** an act-TT a2/A2

a1/A1 c-const **a2/A2** or **a1/A1** ↥ **a2/A2**

iff under the circumstances C, a2/A2 is done *by* doing a1/A1, or *in* doing a1/A1.

For example: Under circumstances

a1/keep the door open ↥ a2/let y pass ↥ a3/do y a favor ↥ a4/get a smile from y

a1/say "No" to y ↥ a2/decline y's request ↥ a3/disappoint y

1.4 Cascades

- The relation c-const is **irreflexive**: If a1/A1 ↥ a2/A2, then a1/A1 and a2/A2 are different.

- The relation c-const is **transitive:** If a1/A1 ↥ a2/A2 and a2/A2 ↥ a3/A3, then a1/A1 ↥ a3/A3
  > *c-constitution forms chains*
  > *several steps of c-constitution form one (larger) step*
  > *c-constitution may be broken down into finer steps*

- The relation c-const is **asymmetric:** If a1/A1 ↥ a2/A2, then *not* a2/A2 ↥ a1/A1.

➢ The relation of c-const gives rise to **tree structures.**

Definition
A **cascade** is an act-tree generated by c-constitution.

1.5 Simple conditions

(1) Logical independence
If a1/A1 c-const a2/A2, then A1 ⋤ A2 and A1 ⋣ A2:

If a1/A1 level-generates a2/A2, then A1 and A2 don't subsume each other.

(2) Identical temporal extension

(3) Quasi identity
If a1/A1 c-const a2/A2, then the A1 act – quasi – *is also* an A2 act.

(4) Contingent dependency at token level
If a1/A1 c-const a2/A2, then an act of type A1 is necessary for an act of type A2 to exist:

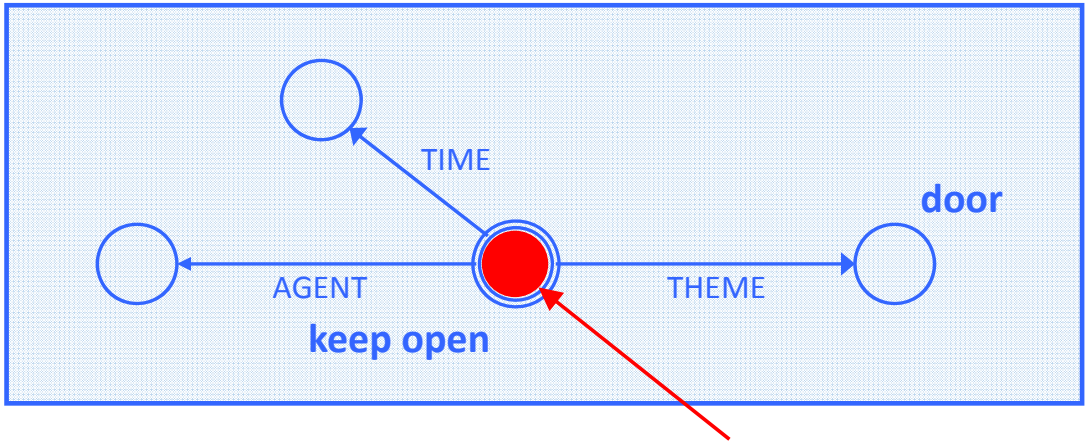
No A1, no A2.

1.6 Frames

We represent act-types as frames.

- Düsseldorf Barsalou frames are representations **of TTs**:
  representations of a type (= a category) by description of a token (= a member of the category)

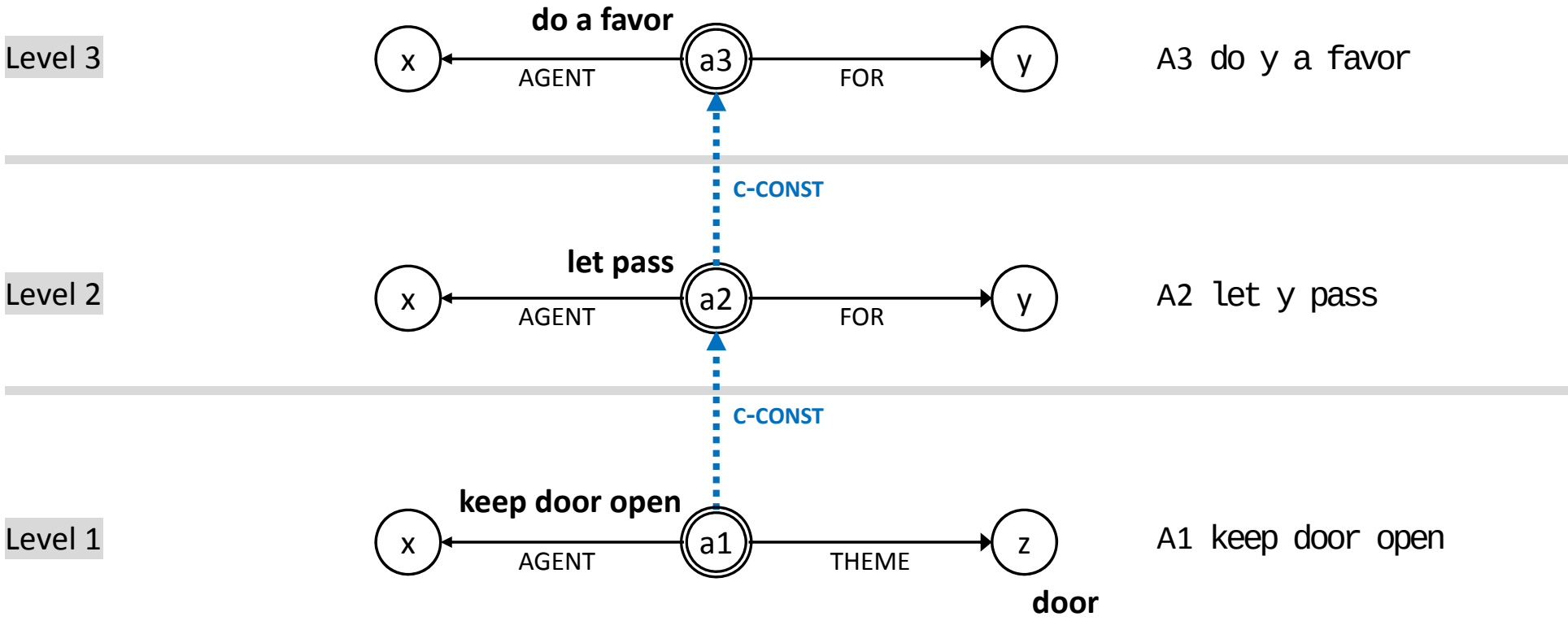
frame for the act-type keep a door open



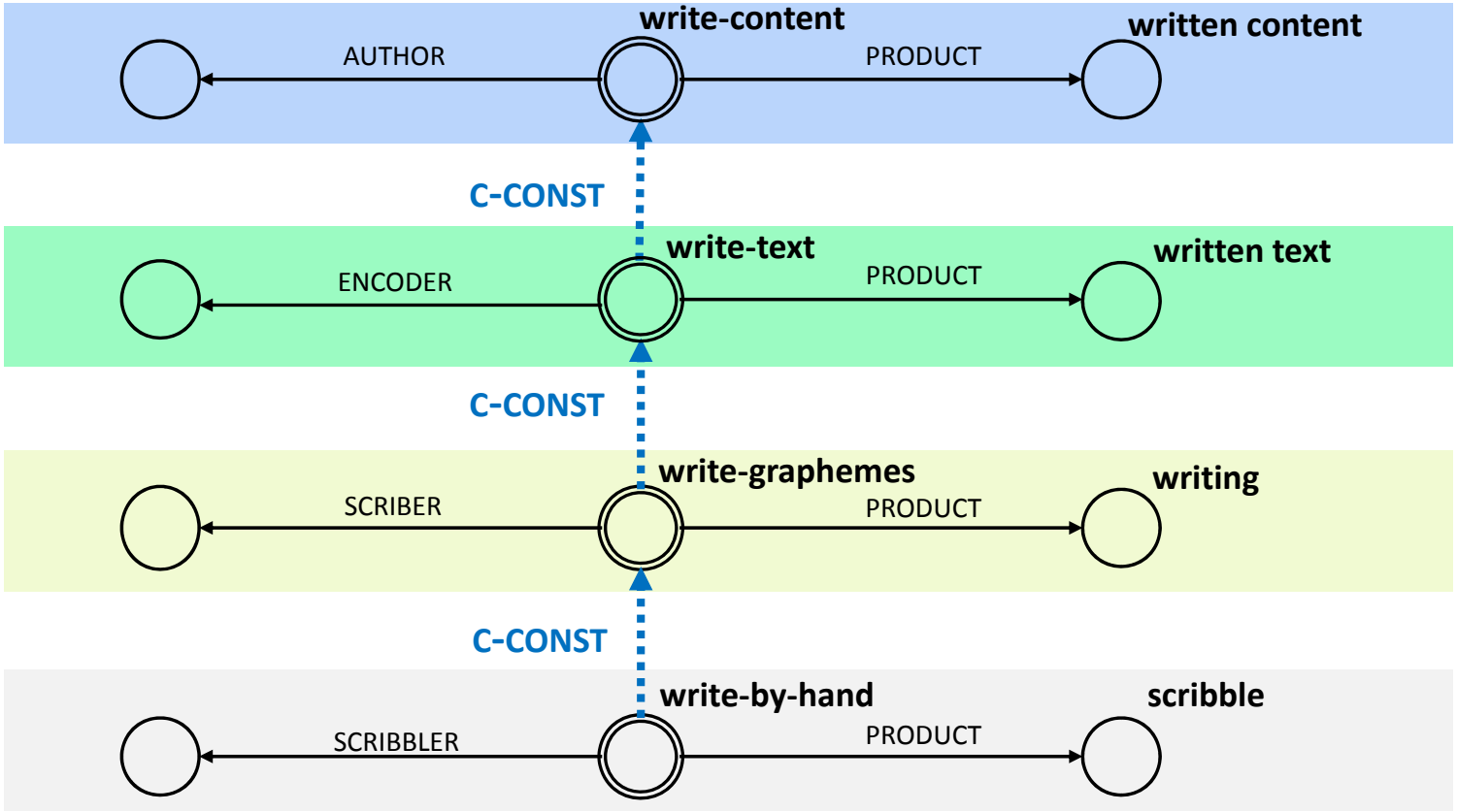
central node: act-token of the type keep a door open

1.7 Cascades of frames

We represent cascades as trees of frames, built up by c-constitution – ***a relation between frames***.



1.8 The cascade for ‘write’



1.9 Reference

- The levels selected by the argument specifications, modifiers, and other adjuncts may not be the same.

- Statements about the writing of somebody may relate to several levels simultaneously.

  My grandmother used to write her personal letters on her typewriter.

➢ **Reference is to all cascade levels simultaneously because all that happens in one.**
The lower levels are conceptually necessary for the higher levels to exist.

1.10 Cascades in cognition and ontology

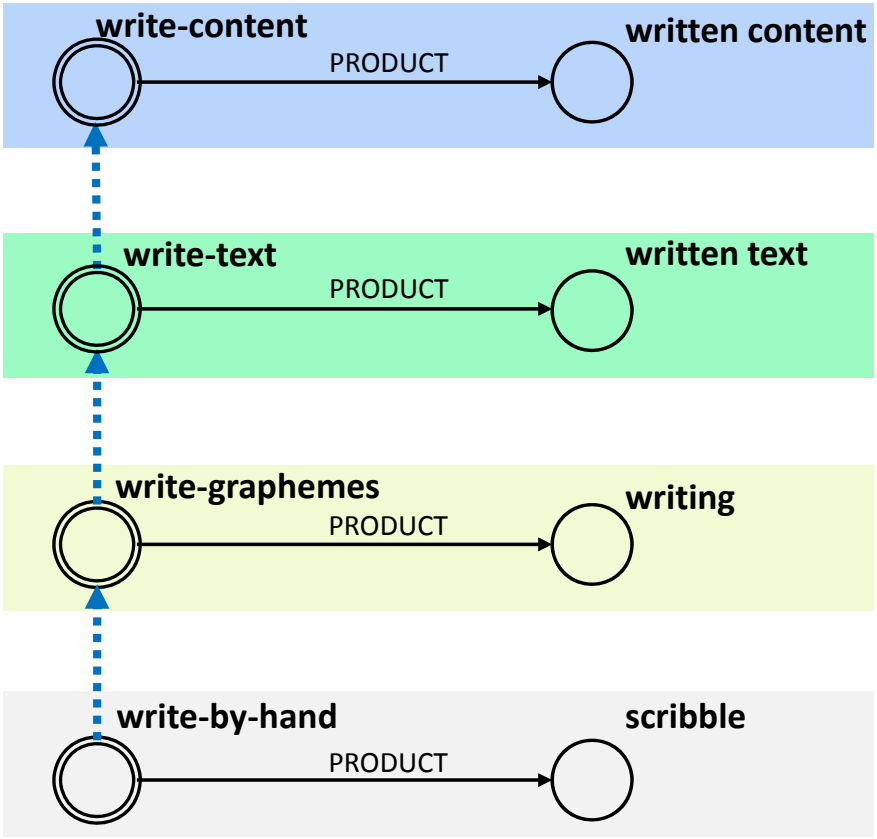
➢ **Hypothesis**
Whatever we categorize **we categorize at potentially more than one cascade level**.

- The bits and pieces of what is **reality to us** as human cognitive individuals always matter in many different contexts.

- There may be **macro-levels** across action and role concepts, such as
  - the personal level of individual appraisal;
  - levels of social interactions, relationships, and institutions;
  - levels of abstract reasoning

➢ **Hypothesis**
Level-generation is a **basic brain mechanism.**

2. Roles and the extension of c-constitution to act arguments



write **a reply**

write **a paragraph**

write **'mama'**

write **whorls**

2.1 Product specification

- Product specification **selects the level** where it saturates an argument of the verb.
- Saturation at a higher level constrains the argument types at the lower levels.
- Most object specifications are level-selective.

2.2 Roles of objects and c-implementation

Let a1/A1 c-constitute a2/A2. Let x1 and x2 are arguments in the same general role, of a1/A1 and a2/A2, respectively, then x1 in a1/A1 **c-constitutes** x2 in a2/A2.

For example: The graphemes produced at Level 2 of writing, under circumstances, constitute text.

The text produced at Level 3 of writing, under circumstances, constitutes content.

"x in semantic role R in e/E" is an object-under-description: x/R(e/E)

- The informal properties of correlates under c-constitution hold here, too.
  (logical independence, sloppy identity, existential dependence)

2.3 Agent specification

Deviating from Goldman's notion of act-trees, we may observe:
The agents involved in writing are not necessarily the same person.

We may assume that the agent roles in a cascade can be **delegated** down from the content level agent. (Cf. the notion of "footing" in Goffman 1979)

	script	**text**	**content**		**role**
D T writes a letter to Putin	–	–	+		principal
X writes a letter to Putin	–	+	–	ghostwriter	encoder
Y writes a letter to Putin	+	–	–	typist	scriber

2.4 Roles of agents and c-implementation

If a1/A1 c-constitutes a2/A2, then
the agent of a1/A1 **c-implements** [c-constitutes] the agent of a2/A2.

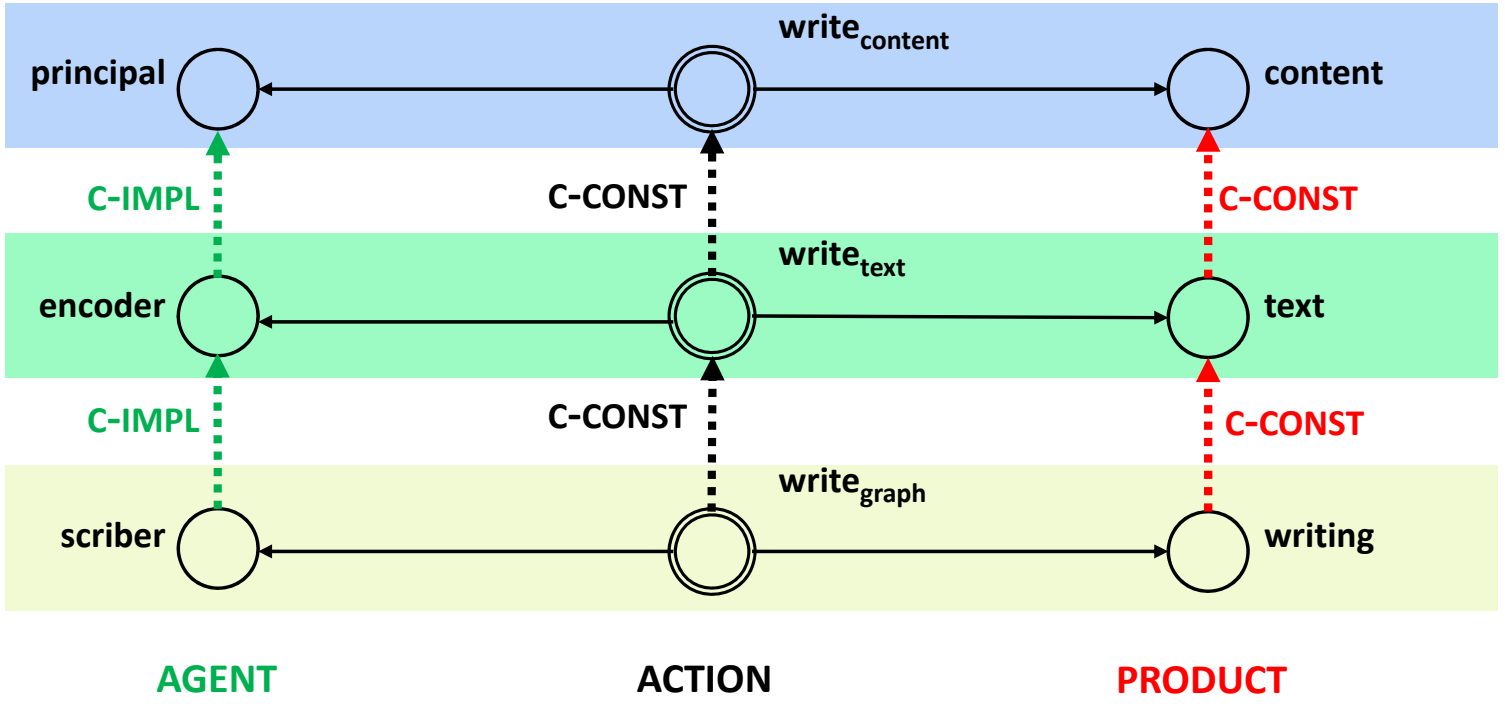
For example: Carl = AGENT(a3/$write_{text}$ the speech)

Joey = AGENT(a4/wake up the baby)

Sam = BENEFICIARY(a3/do y a favor)

- The informal properties of correlates under c-constitution hold here, too.
  (logical independence, sloppy identity, existential dependence) :
  - an act of type A1 need not be an act of type A2 and vice versa
  - in the given constellation, the role incumbent and the role inplemented are cotemporal.
  - If a1/A1 c-impl a2/A2, then the A1 act – quasi – *is also* an A2 act.
  - If there is no p1/AGENT(a1/A1), then there is no p2/AGENT(a2/A2)

2.5 C-constitution as a multi-track relation between act frames



3. Dot types

3.1 Characterization

[following Pustejovsky 2009, Asher 2011]

- "Dot types" are complex types, written "X•Y" for things that are of either type or of both types
- Assigned to words, each type within a dot type is the type of one *sense* of the word.
- The dot is neither conjunction nor disjunction.
- For each sense pair, there is a relation which "connects" the senses in a well-defined way.
- **"Dot objects"**, a.k.a. "dual aspect objects", are things of dot types, for example x·y of type X•Y. The components of dot objects are **TTs**: x/X and y/Y.
- **Evidence** for dot types:
  Applicability of predications with incompatible selectional restrictions (e.g. copredication).

3.2 Major types of example

book	`physobj` `•information`	*she burnt the book …* *… after reading*	physobj *contains* info [Pustejovsky 2009]
lunch	`event` `•food`	*the lunch won't take long* *I have my lunch with me*	food *theme of* event [Pustejovsky 2009]
coffee	`fruits` `•liquid`	*pluck / roast the coffee* *pour / drink the coffee*	fruits *processed into* liquid [Pustejovsky 2009]
bronze	`matter` `•object`	*lump of bronze* *a bronze by Bernini*	artifact *consists of* matter [Asher 2011]
keep a promise by dancing	`action` `•action`	*he kept his promise …* *… by dancing with him*	action *realizes* action [Bücking 2014]

3.3 The metonymic subgroup

- Deverbal nouns are considered dot object nouns:
  construction classification examination appointment inflammation belief promise

- Event denoting nouns
  exam lunch laundry concert symphony class lecture

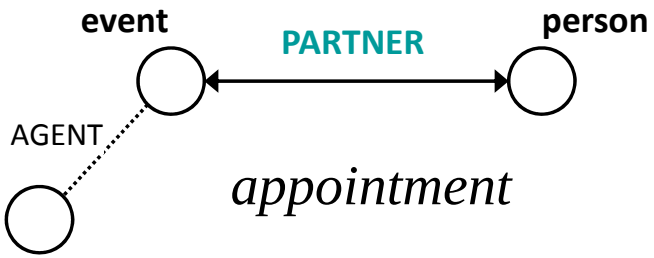
  ➢ The event frame provides a **metonymical relation** between the dotted types, in most cases a relation between the event and one of its arguments: the relation is the thematic role.

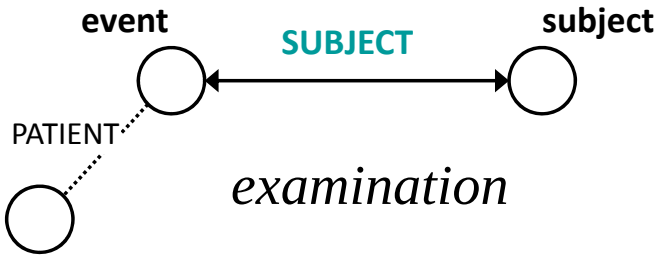
- Other dot nouns with metonymical relation
  book newspaper university library

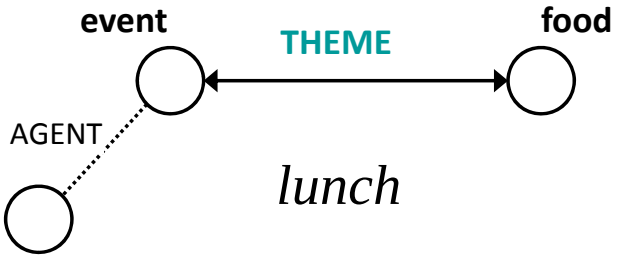
  ➢ `container↔content` and various other relationships

3.3 The metonymic subgroup (ctd.)

- Metonymy is essentially based on an attribute relation within a frame:
  The central node is shifted to a dependent node, i.e. to the value of an attribute. [Löbner 2013, §12]







3.3 The metonymic subgroup (ctd.)

- With a frame, not only the central node is given, but also everything connected to it:
  With a lunch/`event` the lunch/`food` is given – as the value of the THEME attribute.
- The dot relation is the attribute relation.
- The frame for the related sense is the same frame with the referential node shifted.
- Almost all deverbal nouns have a frame resulting from the verbal event frame by a simple such shift of the central node.
- The same type of shift underlies all metonymies, such as

  Honda `producer` ↔ `product`
  newspaper `institution` ↔ `printed copy`
  library `book collection` ↔ `building`
  …

3.4 The processing subgroup

coffee chicken bronze

- The referents of the two types are related by a process that turns the first into the second
- The two correlates are related by a **'processing' frame** with attributes for the INPUT and the OUTPUT of processing.
- Unlike with the metonymic type,

  related tokens of the two types do not co-exist at the same time,

  but constitute different stages of matter.

4. Dot types and cascades

➢ ***Are dot types related by c-constitution?***

The members of a dot type always fulfil the criterion of logical independence.

4.1 Dot types not related by (generalized) c-constitution

- Dot objects of the processing type are not related by c-constitution,
  as the correlates do not exist at the same time.

- Dot objects of the various metonymic types have identical temporal extension (roughly),
  but lack the property of quasi identity:
  the examination/`event` is not [in any sense] the examination/`subject`
  the book/`physobj` is not the book/`content`,
  and so on

4.2 Dot types related by (generalized) c-constitution

- Bücking's `action•action` dot objects are instances of cascades.
  The *by* or *indem* relation immediately corresponds to level generation / c-constitution:
  if y/Y is done by doing x/X, then x/X c-constitutes y/Y.

- Dot objects of the role type are related by c-constitution,
  "Sam **as** a lawyer" is Sam implementing a lawyer: Sam and the lawyer he implements form a cascade.

- There are also objects in roles generated by c-constitution:
  the *burger* **as** a meal, the *screwdriver* **as** a chisel, the *car* **as** a vehicle

- Some types of dot objects are variations of (parts) of Austin's speech act cascade (generalized):

  phonetic act ↥ rhetic act ↥ illocutionary act
  lecture novel interview question music concert

4.2 Dot types related by (generalized) c-constitution (ctd.)

Material constituency can be considered another variant of c-constituency.

- *Mary and John* [*as a couple*]
  Under circumstances, Mary and John constitute a couple / form a couple (= a social unit)

- *coin money*
  categories of **social objects:**
  Under circumstances (including social conventions and institutions) certain objects **count as** social objects, e.g. money. A piece of metal may c-constitute a coin (and thereby money).

- *ring*
  Artefacts
  Under circumstances (i.e. if they are produced accordingly), artefacts constitute a quantity of material constitutes an artefact: a gold ring, a silk cloth.
  Unlike in the processing examples, both coexist.

5. Cascades and dot objects

5.1 All cascades can be considered dot types / dot objects.

- Cascades present simultaneous type assignment to one underlying entity.
- Predications can address a single level within a cascade / a single type.
- The relation connecting the correlates is – invariably – c-constitution.
- The “NP as a N” relation is indicative of a role cascade.
- Cascade dot-objects are restricted by the “simple conditions” mentioned above, including temporal coextensionality.

5.2 Not all dot objects are cascades

- The metonymic type is not.
- The processing type is not.
- There are more types that are not, for example
  the *temperature* type `measure•value` [Pustejovsky 2005]

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