

Cascades

Part 2: Cascades of objects.
From level-generation to frame-generation

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0. What this is about

The following is meant as a contribution to **natural language metaphysics** (Moltmann 2017), i.e. the conceptualization of reality (“the world”) as it is reflected in the categories of the semantics of natural languages.

Reality is what is real to the language user and their language-inherent ontology and metaphysics.

This view results in a rich ontology in which, e.g.,

- making a mistake by opening the window is two different types of act in one: opening the window and making a mistake,
- instances of acts, objects, persons may figure as elements in “cascades” that are co-occurring, co-existent, and coupled by circumstances in a given situation,
- each level of a cascade represents a different way of conceiving of the entity.

1. Recollection of Part 1

1.1 Alvin Goldman (1970) : “Level-generation” of acts

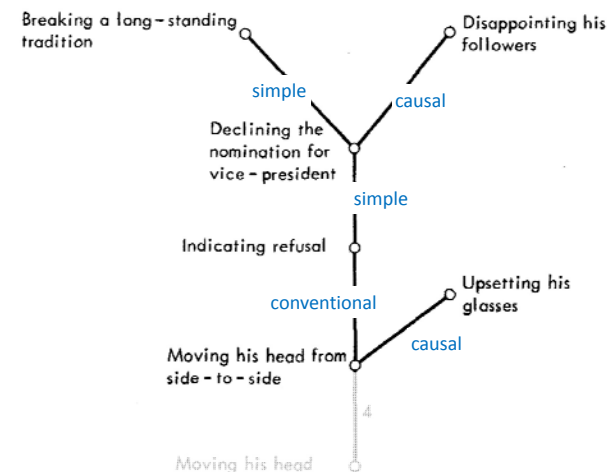
Higher levels of acts (in what we call “cascades”) are **generated by certain upward relations**: S does A’ “BY or sometimes IN” doing A under conditions C*. [p. 20]

type of generation	generating level A	generated level A'	conditions
1 causal	S does A S shoots at B	S causes E S kills B	under circumstances C*, Act A causes event E
2 conventional	S says “Hi!” to B	S greets B	circumstances C* and rule that A done in C* counts as A' guarantees that A'
3 simple	Usain Bolt runs 100 m in 9.57 sec	Usain Bolt breaks the world record over 100 m	under circumstances C*, S doing A entails S doing A'
4 compound	A ₁ : S holds pen A ₂ : S presses pen on surface A ₃ : S moves pen	S draws something on a surface with a pen	Acts A ₁ , A ₂ , ... jointly constitute A' and are circumstances to each other

1.2 Act-trees

Goldman (1970: 34)

[type labels added]



1.3 Cascades

A **cascade** is an act-tree that does not bifurcate upwards.

1.4 The upward $\hat{\uparrow}$ cascade relation: constitution

The upward relation is generalized level-generation: **constitution_under_circumstances** **c-const.**
What acts a given act-token may be considered to level-generate, depends on the circumstances.

1.5 The downward \downarrow cascade relations IN and BY: substrate

The relation **IN** can be considered an attribute **IMPLEMENTATION, PHYSICAL_BASIS, FOUNDATION**;
its inverse is **COUNTS_AS, AMOUNTS_TO, CONSTITUTES, MEANS**.

S does A' **in** doing A.

Doing A **is** doing A'.

Doing A' **consists in** doing A.

[BNC] *All through "The Graduate" Nichols thought he'd made a mistake in casting me.*

The relation **BY** can be considered an attribute like **MEANS (OF)** (if A' is intended), **CAUSE**;
its inverse relation is **EFFECT**.

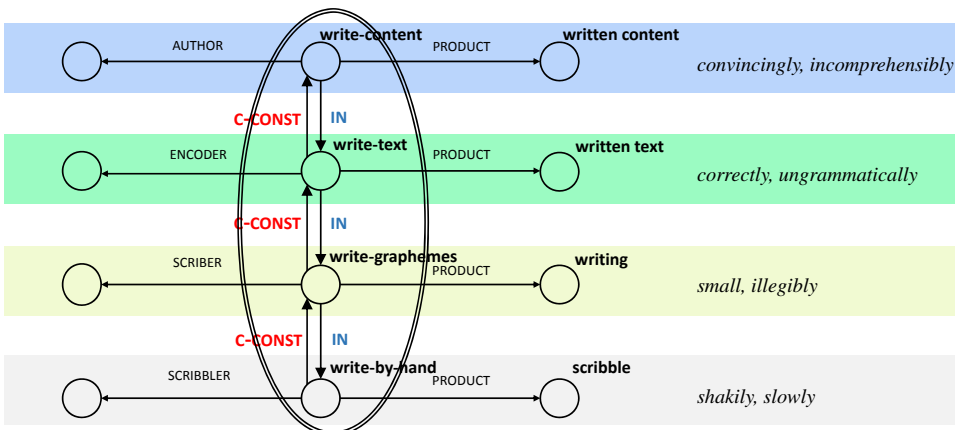
S does A' **by** doing A.

Doing A **has the effect of** doing A'.

A' **is not** A.

[BNC] *reduce the number of new HIV infections by giving young people the facts about AIDS*

1.6 The internal cascade of the 'write' concept



1.5 The multilayeredness of action

The cascade approach to action is part of **natural language metaphysics**:

The theory of the structure of reality as it is reflected in the notions of natural language.

The cascade approach to action illuminates the **multilayeredness (Vielschichtigkeit)** of our conceptualization of action:

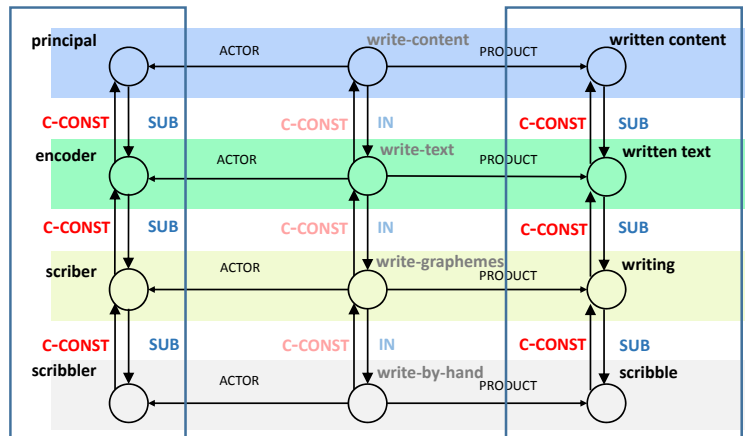
Actions are conceived as constituting, in one, an unlimited number of related action types.

Ex.: press the switch $\hat{\uparrow}$ turn on the light $\hat{\uparrow}$ awake the child $\hat{\uparrow}$ ruin one's night $\hat{\uparrow}$...

At each level the action is related to a particular context (e.g., a technical context, a context of interacting with certain persons, etc.)

and thereby placed in particular causal relationships.

2. The writing cascade revisited: cascades of products and agents



2.1 The product cascade

- The acts of writing at each level produce products of different type: scribble, writing, text, content
- Lower levels c-constitute the higher levels; under circumstances ... the scribble **c-constitutes** writing, the writing **c-constitutes** text, the text **c-constitutes** content.
- Conversely, the higher level products are implemented by the lower ones. Under circumstances ... the content **is implemented** by the text, the text **is implemented** by the writing, the writing **is implemented** by the scribble.

2.2 The agent cascade

- The acts of writing at each level are executed by agents in different roles, engaged in the different level actions of different type.
- Lower levels c-constitute the higher levels; under circumstances ... the scribbler **c-constitutes** a writer, the writer **c-constitutes** a text producer, the text producer **c-constitutes** a content producer.
- Conversely, the higher level agents are implemented by the lower ones. Under circumstances ... the content producer **is implemented** by the text producer, the text producer **is implemented** by the writer, the writer **is implemented** by the scribbler.
- Note: The implementation of the lower levels can be delegated top down from the highest level to the levels of text production (e.g. ghostwriter) and production of writing (e.g. typist) [cf. Goffman's 1979 notion of "Footing"].

2.3 Downward-dependence

- For all types of cascades, there is the relation of **downward-dependence**:

The existence of the generated higher level depends on the existence the generating lower level:

NO A, NO A'

no pen-holding, no handwriting
no handwriting, no text-writing,
no text-writing, no content-writing

no scribble, no graphemes
no graphemes, no written text
no text, no written content

no grapheme-writer, no text-writer
no text-writer, no-content-writer

3. From level-generation to frame-generation: attribute relations as generators

General types of attributes

- Correlate attributes MOTHER OWNER PRESIDENT NAME MEANING LOCATION, semantic role attributes.
Bearer exists independently.
- Part attributes HEAD HANDLE ENGINE END
Bearer's and Value's existence depends on each other.
- Affordance attributes AFFORDANCE/FOR
The Value is an abstract type of action in which the Bearer plays a semantic role.
- Property attributes SHAPE COLOR WEIGHT
The Value is instantiated on the Bearer, resulting in a property of the Bearer.

3.1 Correlate attributes

- **Semantic role attributes** (see above)

- **Other role attributes** (and similar)

MOTHER BEST_FRIEND WIFE BOSS

Correlate attributes generate tropes of correlates_as_correlates:

A child_of s.o. level-generates the child's mother and father, i.e. a being-mother/father-of-trope.

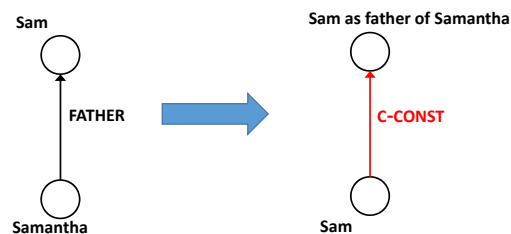
no child, no father etc.

- **MEANING** another correlate:

The mechanism for lexical meanings is conventional level-generation, for complex expressions, it's semantic composition.

no expression, no meaning_of

3.1 Correlate attributes (ctd.)



- The person-role cascade is an immediate element of the frame

3.2 Semantic roles: Event frames level-generate their semantic roles

Traditional result-oriented view on frames:

Event frames contain an event node and dependent nodes for their arguments.

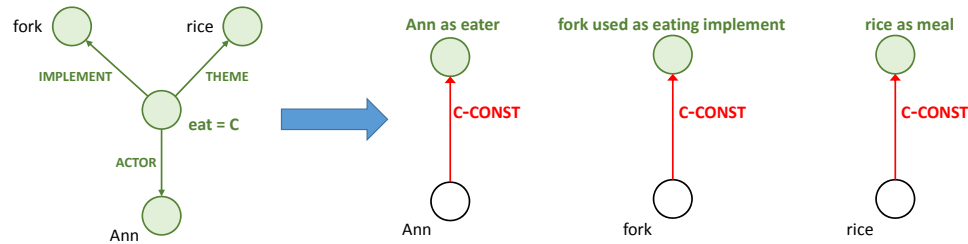
There are attributes that map the event on its arguments.

[Cf. Davidsonian event verb semantics: e , $\text{Agent}(e)$, ...]

Alternative generation-oriented view:

- The event **level-generates its roles**:
no event e , no $\text{Agent}(e)$, $\text{Theme}(e)$, $\text{Instrument}(e)$, ...
- The semantic role assignment **puts the argument into an event role**, it generates an instantiation of the-argument-in-this-role.
- The semantic role assignment **creates a role trope**, an agenthood, themehood etc.

3.2 Events level-generate their semantic roles (ctd.)



- Event level-generates entities_in_argument_roles from entities
- This is encoded in event frames.

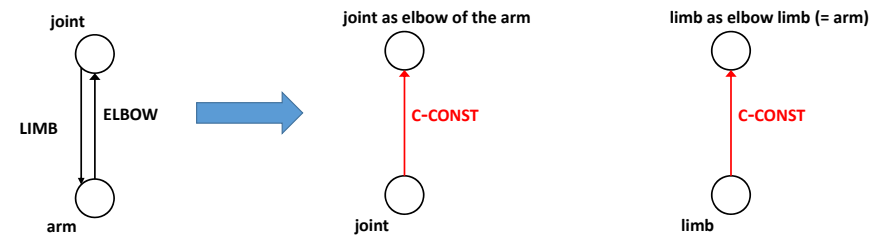
3.2 Events level-generate their semantic roles (ctd.) Integrating entity-role cascades into a case frame



3.3 Part-of attributes

- **Part-of attributes** are bijective functions (the inverse attribute is **WHOLE**). Correspondingly, there is generation in both directions.
 - The whole level-generates its parts as parts.
A thumb is not a thumb unless it is as part of a hand: no hand, no thumb_of.
For every part *y* of the whole *x* there is a **part-trope** “that *y* is the *y*-part of *x*”
 - The totality of parts, in a proper arrangement, level-generates the whole.
This is generalized **compound generation**.

3.3 Part-of attributes (ctd.)



- The object-part cascade and the object-whole cascade are immediate elements of the frame

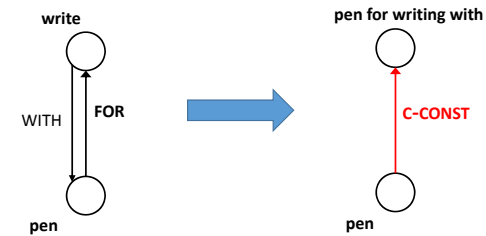
3.4 Affordance attributes (ctd.)

- **Affordance attributes** provide a way / path / mode of level-generating the bearer object of the affordance attribute in the role of figuring as an argument in that kind of action:

The affordance attribute “DRINK_BEVERAGE_OUT_OF” of ‘cup’ provides a way of level-generating ‘cup_used_as_drinking_vessel’ out of the ‘cup’ referent.

- There are alternative ways of using cups, e.g. as an ashtray, but they wouldn’t be written into the meaning of a term for artefacts that are intentionally produced as drinking vessels.
- **Artefact objects are grounded in intention** (to the extent that they are intentionally produced) (cf. Pustejovsky’s “AGENTIVE” quale).

3.4 Affordance attributes (ctd.)



3.5 Property attributes

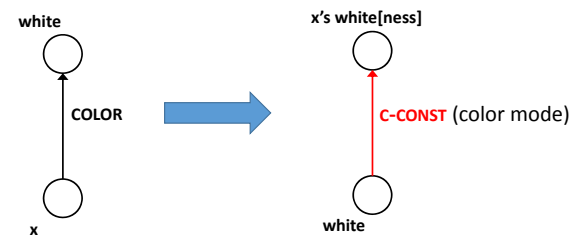
- **Property attributes** like COLOR, SIZE, SHAPE, ... provide a mode of level-generating a trope of being-bearer’s-[mode-]value.

Application of a property attribute creates a (classical) trope.

Trope creation constitutes a specialized mode of level-generation.

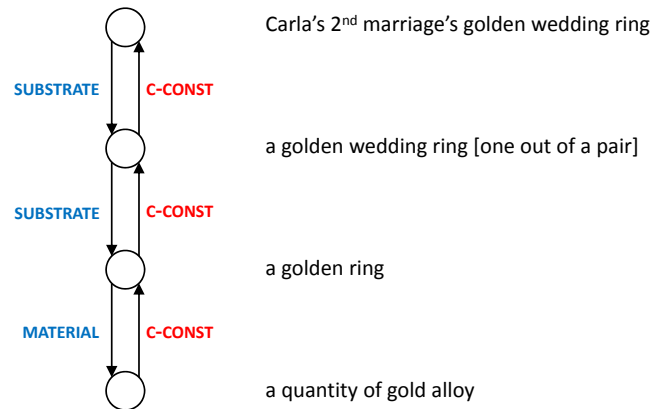
It advances an abstract element of a property space to a trope on/of the bearer of the attribute.

3.5 Property attributes (ctd.)



3.6 The MATERIAL attribute(s)

A cascade of objects



3.6 The MATERIAL attribute(s) (ctd.)

- Assume a **generalized** ↓ **SUBSTRATE attribute** as inverse of a generalized ↑ **C-CONST attribute**.

text ↓ words ↓ letters

music ↓ tones

statue ↓ marble

animal ↓ body ↓ physical matter

write on a keyboard ↓ hit the keys of the keyboard

- The substrate relation between an artefact and its substrate is provided by the source role in the **production frame** for this kind of artefact. The level-generating modality is provided by the type of production event.

3.7 Types of object constituency

- mereology and functionality of constitutive parts
- ordering of elements (e.g. letters in a word, pages in a book)
- coherence
- scale and number of constituents:
 - granularity
 - number of elements: pairs, swarms, peoples, settlements
- complex internal structure: a city, a country, the solar system, the students of a university, the staff of a company, the www, an orchestra
- amorphous masses: liquids, dust, fogs, clouds, flour
- homogeneous (water, sand, rice) vs. heterogeneous (garbage, baggage, freight, furniture, food)
- involvement in one type of action: baggage, equipment, clothing, nutrition

3.8 Frames as the result of conceptual steps building on each other

- “Traditionally” we consider frames as static structures that essentially represent objects and attribute relations connecting them. This holds even for frames that represent dynamic verb meanings.
- However, frames are the **result of concept formation**.
- The above considerations lead to the following hypothesis:
 - All attributes are generalized level-generating relations, i.e. upward cascade relations.
 - Application of an attribute *A* with value *y* to a bearer *x* level-generates a trope “*y*'s being *x*'s value for the attribute *A*”.
 - Cascades spread in different directions, potentially from every established node in frame.
 - Cascade elements inherit lower ones as their substrates, and constrain them top-down.

4. Creating our multi-layered reality

4.1 Action in general as the generation of cascade-layers

- Agents generate their acts: no agent, no act.
Goldman: The **want of the agent causes their act.** (Goldman 1970: 72ff)
- By executing an act, the agent puts herself into the role of agent.
- The agent also puts all the other participants into their semantic roles, thereby **the agent creates role tropes.**
- Agency can be considered a generalization of causal level-generation.
 - ❖ Different understandings notwithstanding, we understand what the actor does as an act-cascade.
 - ❖ We understand the roles of the participants as temporary cascade-levels of their existence.

4.2 Lexical concepts based on semantic roles or: *Concept formation follows ways of action*

There are many nouns in natural language that denote their denotation in terms of its semantic role in some type of event, in particular some kind of action.

- **Agents**
driver speaker burglar vendor customer author lecturer
- **Themes**
food meal drink baggage
- **Undergoers**
patient client passenger audience addressee employee V-ee in general
- **Instruments/implements**
screwdriver opener handle toothbrush vehicle
- **Other**
ticket container

4.3 Object-related level-generation

- By **producing** artefacts, we are understood as creating higher cascade levels for existing objects/materials
> gold ring cascade.
- When we **use** an object for a certain purpose, e.g. for brushing our teeth, we cascade-project it into an object role (e.g. teeth-cleaning implement)
- For very many purposes, specialized artefacts are produced. The purpose-of-use **affordance** forms a key attribute in the concept for this type of artefact.

5. Social roles as cascade-levels

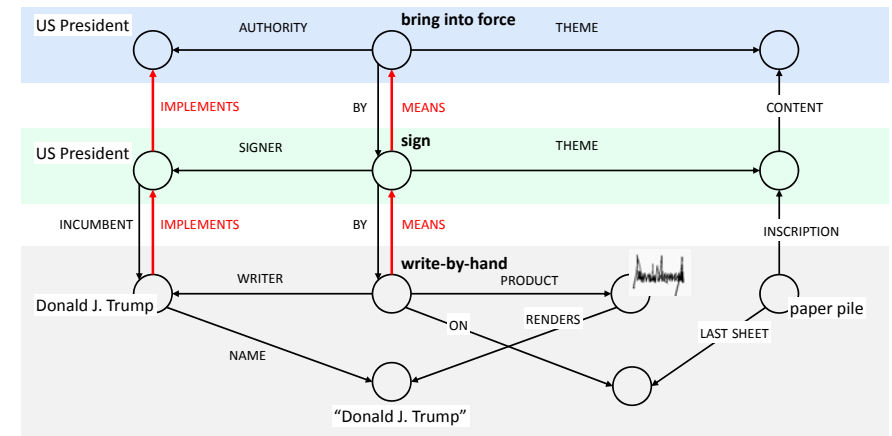
5.1 The nature of social roles

- We **construct social reality** by applying Goffman frames to what people do, (c.f. Erving Goffman's 1974 Frame Theory of social interaction).
 - A Goffman frame provides roles and types of action for the role incumbents. In a given frame, the actions of the role incumbents constitute/count as social interaction; they have a meaning as social interaction that derives from the frame.
Example: putting a letter into a letterbox *means*
 - Roles are enacted by assuming participant roles in certain types of social action.
 - **Social action necessarily is higher-level action** (Searle 1994)
 - Social action level-generates higher social cascade-levels of the agent.

5.2 How social roles come about

- People get into roles by
 - putting themselves into the role , e.g. speaker and listener(s) in a conversation
 - being put into the role by others in some sort of social interaction, e.g. by being addressed in conversation, by being elected, hired, appointed, forced, etc.
- Role tropes are instantiated by persons **enacting social action** constitutive of the role.
- Person-denoting individual, relational, and functional concept nouns denote persons-in-social-roles
 - individual concept: *queen chancellor dean*
 - relational concept: *friend neighbor colleague daughter teacher supervisor roommate*
 - functional concept: *mother husband boss*

5.3 US President Donald Trump signs an executive order



5.4 Multiple social roles

Persons can be in different roles at the same time, but as persons-in-a-role, i.e. protagonists (Akteure) they are different.

- Angela-Merkel-the-chancellor is different from Angela-Merkel-the-head-of-the-CDU and from Angela-Merkel-the-wife-of-Joachim Sauer and from
- These Angela Merkels pursue different intentions, have different obligations and different concerns; they have different social contacts; they do different things; they have different image; different character; different preferences etc. because all that is part of the respective social roles.
- The incumbent may be entitled to certain action only in particular roles.
- Certain actions in one role may level-generate actions in conflict with other roles held simultaneously. For example, fulfilling her political agenda may be in conflict with taking care of her health as a private person.

6. Further perspectives

6.1 Ontological issues

- Integrate the level-generated entities into a rich general frame ontology.
- Properly generalize level-generation to the realm of objects.
- Allow for more specific, action-related, mechanisms of level-generation.

Relate cascade theory to Pustejovsky's "dot objects"

6.2 Level-generation in time

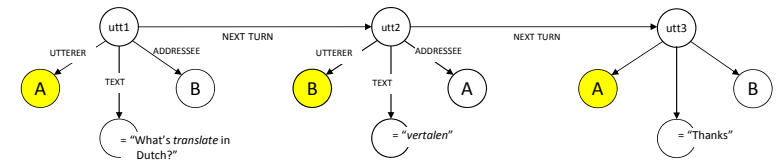
- Introduce temporally sequential level-generation in order to
 - model sequences of events where one presupposes the former and creates the next one (“scripts”): forward **PROGRESS** attribute;
 - model the (time-consuming) production and usage of artefacts as steps of level-generations;
 - model creative processes such as phonetic articulation, syntactic composition, linking, semantic composition as steps of level-generation.

6.3 Turn-taking (cf. Sacks, Schegloff, Jefferson 1976)

Person S officially (i.e. to the understanding of the interlocutors) takes the turn;

- thereby S **assumes the role of speaker** in an act of utterance;
 - S acquires the **right to contribute** one unit of discourse to the ongoing conversation, uninterrupted;
 - S acquires the **right to choose the next speaker** within S’s turn;
 - S is **obliged to produce a “transition relevance point”** (end of unit);
 - S **quits the role of speaker** as soon as S has produced the end of the unit and passes the floor on.
- Turntaking only works in **collaborative interaction**.

Three turns



6.4 Multi-agency

- Social interaction is a matter of multiple agents participating in what they understand as the same frame (in Goffman’s sense)
- **Contextualization**
For mutual understanding of their interaction, participants need to communicate about, and negotiate, the frame to be applied : they need to contextualize to each other what they understand is going on.
(Clark 1996 on verbal interaction, Gumperz 1992 on contextualization)

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