

## Cascades of action levels and the decomposition of action verb meanings

**1. Levels of action.** The talk is concerned with the mental, or cognitive, ontology of human action as is relevant for the understanding of the meanings of action verbs. It is generally accepted that a particular doing, like Trump's writing his name on a piece of paper, can be seen as constituting acts in an unlimited number of ways. It is, however, controversial in philosophy and semantics whether such a doing should actually be considered one act or as many acts as there are logically different descriptions of it. Castañeda [1] portrays the controversy as one between "unifiers", e.g. Davidson [3] – they take the position that there is just one doing – and "multipliers" like Goldman [5] who claim that what is done at different levels of description is as many different acts; his approach has been characterized as a "fine-grained" view of action. Goldman's is a theory of act tokens. A particular act token, he argues, is in a relationship of "level-generation" to other act tokens by the same agent and at the same time: it "level-generates" acts at higher levels, and it may itself be level-generated by acts at lower levels. As Castañeda [1] points out, a concrete act token can always be considered to generate an infinity of other act tokens. This is due to the fact that higher levels, for example acts that are consequences of the acts at lower levels, may be generated by particular conditions given in the context.

**2. Goldman's level-generation, Clark's action ladders.** According to Goldman [5], an act (token) is related to other act-tokens by the same agent at the same time in a hierarchical tree structure. There are different types of level-generation, the upward relation  $\hat{\uparrow}$  in these trees; Goldman distinguishes simple ( $x$  runs 100 m in 9.5 seconds  $\hat{\uparrow}$   $x$  breaks the world record over 100 m), conventional ( $x$  nods  $\hat{\uparrow}$   $x$  agrees), causal ( $x$  hits  $y$  in the face  $\hat{\uparrow}$   $x$  breaks  $y$ 's nose), and compound level-generation ( $x$  jumps,  $x$  shoots  $\hat{\uparrow}$   $x$  jumpshoots); we omit the controversial type of augmentation generation. The downward relation consists in " $x$  doing  $A'$  [higher level] by, or in, doing  $A$ ". Crucially, all modes of level-generation involve additional necessary conditions. Clark [1] employs a similar, though less differentiated notion of "action-ladder" in his model of social interaction. The actions of an action ladder "begin and end together" (p. 147). Actions at lower levels, cause what is done at higher levels; actions are completed in the ladder bottom-up. Conversely, higher levels are evidence that the lower level actions were performed. Similarly to Goldman, the downward relationship is  $x$  does  $A'$  by doing  $A$ .

**3. From Goldman's theory of act tokens towards a theory of action types.** It will be argued that application of Goldman's theory of action to the modeling of the lexical meaning of action verbs allows a better understanding and a more adequate decomposition. At the level of lexical meaning, one is dealing with act[ion] *types* rather than tokens, as the context of action and any particular conditions required for level-generation are not unavailable premises of inference. The condition of context-independence restricts the mechanisms of level-generation to a small number. A further restriction arises from the commitment of frame decomposition to cognitive plausibility.

The arguments for applying Goldmanian level distinctions in the conceptual modeling of verb meanings are these: (1) If the same type of action can systematically be described at multiple levels, independent of context, this needs to be reflected in decomposition as part of cognitive reality. The multiple-level approach is corroborated by the data of verb semantics: (2) The distinction of levels is relevant for modeling the interaction between adverbial modifiers and action verbs – they may apply specifically at different levels. (3) The meanings of action verbs allocate the event denoted at different levels of action, more often than never leaving open what the actual basic doing of the agent is; also, it appears, the level referred to is not necessarily fixed in the lexicon.

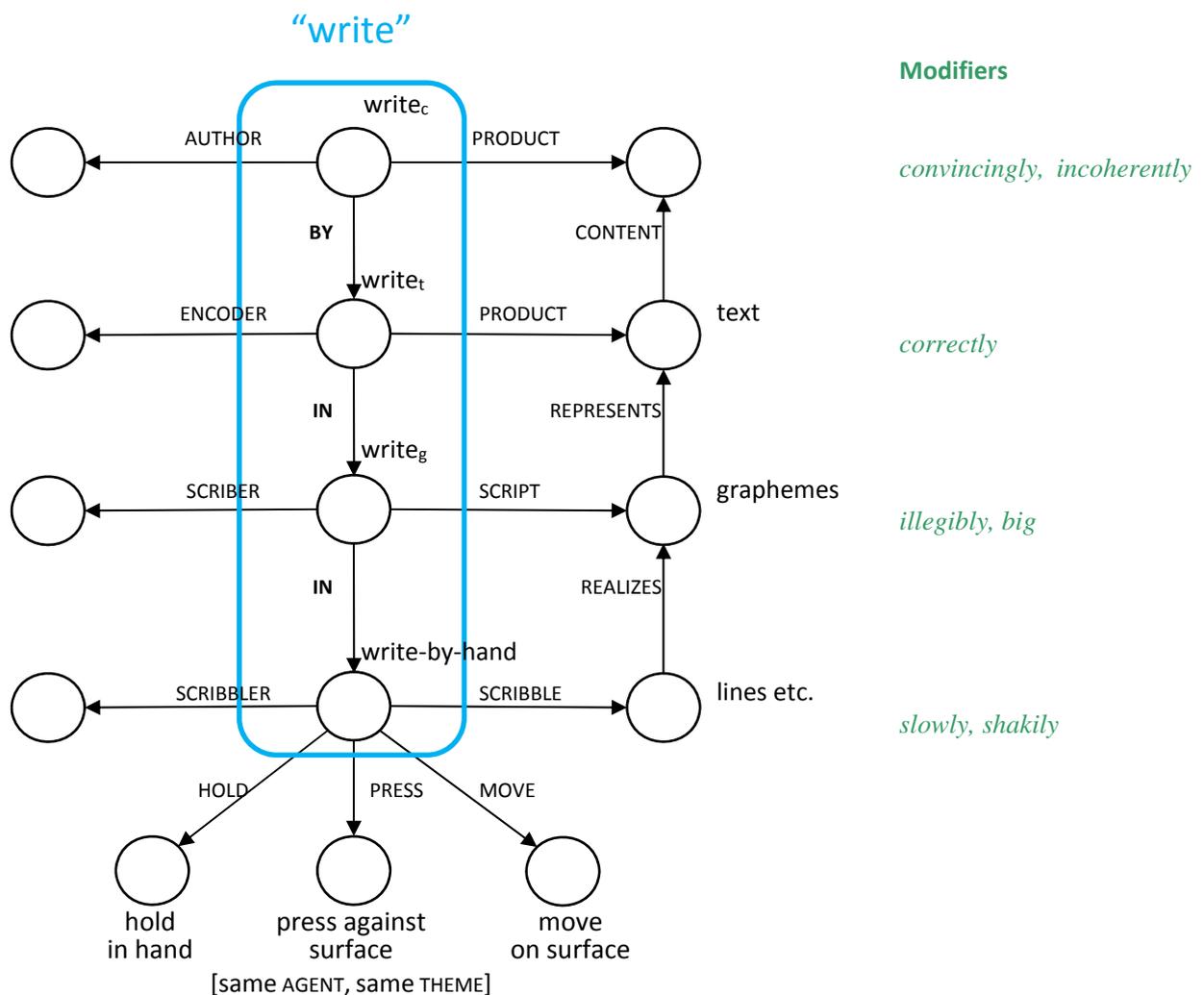
The discussion addresses the fact that one and the same action can be conceived of at different levels of what is done – from basic levels of physical doing up to more abstract levels, including social interaction. For example, Eva writes a letter to her friend. She may do this by moving a pen on her favorite stationery, producing written signs that can be read as meaningful text, and thereby communicating with her friend. These are conceived of as different actions; they are carried out

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with different objectives; the respective agent, although the same person, acts in different roles, and interacts with different material objects and persons in different ways. However, at all these levels of the action, we can describe what Eva does by using the sentence *Eva writes a letter to her friend*. It will be argued that this is not due to an accidental polysemy of the verb *write*, but rather reflects general aspects of the cognitive ontology of action type concepts in the lexicon. Any action type involves a “cascade” of intrinsically related other action types.

**4. A frame model of cascades.** The essential relational structure of cascades of action can be modeled by frames in the sense of [6], by employing attributes that correspond to the constitutive relations. An act on any non-basic level is necessarily implemented by a lower-level act, the lowest being the physical doing. There is only one such substrate for any act, whence we are entitled to assume an attribute that assigns to a non-basic act the act that level-generates it. There is evidence that it might be indicated to distinguish two such attributes, the IN attribute of IMPLEMENTATION / PHYSICAL BASIS for the cases where x does [higher-level] A' in doing A, and a BY attribute for the MEANS of achieving an act A' by doing A. These two downward attributes have upward inversions: COUNTS\_AS / AMOUNTS\_TO / CONSTITUTES for IN, and EFFECT, or CAUSES for BY. These upward and downward attributes apply to conventional and causal level-generation, respectively. “Simple” level-generation (ex. break the world record) is completely contingent on context and will not be found with lexical action-type concepts. Compound level-generation (ex. jumpshoot) can be modeled as part actions constituting the complex whole. The parts correspond to mereological attributes of the next level; notably, mereological attributes are biunique.

## 5. Application to the semantics of Action verbs: the ‘write’ cascade



The figure displays a cascade involved in one method of writing – writing by hand. The physical level is added for the sake of concreteness. It cannot be considered part of the lexical meaning. Given that the verb can denote writing by hand as well as by a computer or other means, we have to assume that the IN attribute of the mid-level *write<sub>g</sub>* is not specified (though present) in the lexical frame. Similarly, the higher levels, though accessible and often made use of, may not be elaborated in the lexical frame. In lexical frames, the generated higher levels are not arbitrary. For ‘write’, the level above the central one will be specified as a level of text production. As all levels displayed here (and maybe more) can just be called “write”, it wouldn’t make sense to distinguish one of the four nodes within the blue box as the predestined referential node of the frame. We assume that a referential node will be chosen in context.

**5.2 Cascade levels and modification.** As indicated in the figure, adverbial modifiers apply at different levels of the cascade. Some are uniquely related, like *illegibly*, *big*, *shakily*, or *convincingly*. Others can be associated with more than one level: *fast* can relate to the physical level as well as to the content and other levels; *elegantly* may address the grapheme level or the content level.

For adverbials such as *intentionally*, cascade structures matter in other regards: one can do something intentionally at a particular level, but by doing that level-generate an act that is not intended.

**5.3 Cascade levels and lexical meaning.** A look at the vocabulary of action verbs shows that many verbs specify actions at a level above the concrete physical act. Verbs of motion like *come*, *go*, or *cross* leave open the means and modes of locomotion; speech act verbs do not specify the locutionary level; verbs of causing emotional reactions, like *annoy*, *frighten*, *delight*, *offend* have an unspecified BY argument. Certain verbs of social interaction like *help* leave open by what kind of action the interaction is done; one can do almost anything to help somebody under circumstances (see Engelberg [4] on ‘help’). Even verbs of physical action do not fix the bottom level of physical implementation: *eat*, *walk*, *grasp*, *kick*. The concrete BY level, it appears, is generally not addressed by lexicalized meaning. Sæbø [7] discusses two types of answer to *how* questions, like *How did he kill the victim*. One type consists in specifying the method by which the action is implemented; this corresponds to a specification of the IN or BY attribute in the respective cascade.

**5.4 Agent roles and products.** The levels of action are paralleled in the semantic roles of the acts. At different levels, products of different sorts form the THEME of the action: lines on paper, graphemes, text, content. In a sense similar to the level relations for acts, the products at the different levels build on each other; the lower ones are the substrate of the higher levels. Likewise, the agents of the acts, although usually the same person, act in different roles that build on each other; note that lower level agency can, under circumstances, be delegated to other implementers.

The three threads of cascades can each be considered as building on the same physical lowest stratum, but expand to different levels of description, and into different contexts where they constitute different things in our mental ontology.

**6. Philosophical issues.** It has been proposed to consider the upward cascade relations as instances of supervenience (e.g. Engelberg [4] for ‘help’). The talk will address the relationship between level-generation and supervenience, which will be argued to be a weaker, though concomitant relation.

### References

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