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On type composition and agentivity

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1 Introduction

While grammatical effects of animacy – exemplified by differential object marking or argument linearization – and semantic or pragmatic adjustments of animacy – illustrated by type shifts – have been discussed extensively in the literature, de Swart and de Hoop (henceforth dS&dH) present a valuable connection between these two areas of investigation and establish a distinction between grammatical and conceptual animacy.[1] This commentary will focus on covert conceptual shifts as illustrated by the *ham sandwich* example in the target article, where one type of concept (e.g. an artifact-denoting entity like *ham sandwich*) is used to refer to another semantic type (e.g. a person associated with the artifact such as the ham sandwich orderer) (cf. e.g. Nunberg 1979). Although the animacy shift is central to this particular covert conceptual shift, such shifts also occur between ontological types not involving animacy, which calls for a more general account of conceptual shifts involving a rich type system (see Section 2). Such a type system would then also reflect a further distinction between true conceptual shifts (which from a processing perspective are computationally demanding) and what I refer to as conceptual alternations (for which two or more extensions of a concept are equally available, as exemplified by the alternation between the person reading of *meeting Goethe* and the interpretation as an informational object in *reading Goethe*).

Given the considerable availability of different conceptual shifts, it is nevertheless striking that the *ham sandwich* shift shows a lot of cross-linguistic variation, while the attestation of other conceptual shifts is much more stable across languages. This indicates that shifting an inanimate entity to an animate entity is subject to specific constraints, which may relate to the privileged status of agents in human cognition (e.g. Leslie 1995) and is best framed in

1 Abbreviations used in this paper: *NOM* nominative, *V* verb, INF infinitival, N neuter, PTCP participle, PRS present, SG singular.

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terms of an agentivity-based account. An approach based on agentivity features is also needed to account for nuanced distinctions between inanimate entities that act as if they were animate. This is illustrated for predications involving natural forces or machines that allow for inanimate entities in prototypical agentive argument positions, which have no overt marking of the alleged animacy shift and in which the inanimate entities do not undergo a conceptual shift (Section 3).

Overall I will argue that covert conceptual "shifts" rely on two different kinds of lexical representations to account for the shift/alternation distinction (exemplified by the *ham sandwich* vs. the *Goethe* contrast). This lexical representation includes a rich type system with specific properties for each type. Accordingly, nonbinary animacy effects can be effectively explained by evoking the notion of agentivity.

2 Conceptual shifts and conceptual alternations

Animacy is an inherent feature of an argument but the sentential or discourse context can enforce a conceptual shift, for instance in genre-specific contexts such as fairy tales or cartoons but also in situation-specific or conventional cases where the immediate selectional requirements of a predicate call for a particular type of argument. Such shifts occur in both directions – from inanimate to animate (1) and vice versa (2/3) – and can be triggered by requirements of the verb (1/2) or the adjective (3).

(1) The ham sandwich wants to pay. (*referring to the person associated with the ham sandwich*)

(2) Sarah read Goethe. (*referring to the informational object, i.e. the work of Goethe*)

(3) David looked at the wooden giraffe. (*referring to an artifact in the shape of a giraffe*)

Processing data indicate that these covert type shifts are qualitatively different and that the observed differences cannot be explained on the basis of the direction of the animacy shift. Using for instance electrophysiological measures, it has been shown that contextually licensed conceptual shifts of the type exemplified in (1) engender cognitive demands (relative to a scenario in which

an animate entity is introduced) and these processing costs have been associated with the effort required for reconceptualization and the resulting updating of the mental representation (Schumacher 2011, 2014). In contrast, the conceptual shift from the author denotation to his work in (2) does not exert specific computational demands, i.e. processes time-locked to the onset of *Goethe* show the same profile as a minimally differing control condition in which *Goethe* refers to the person (Weiland-Breckle and Schumacher 2017). Crucially, other sentential contexts in which conceptual shifts from animate entities to inanimate extensions occur provide evidence for costs associated with the conceptual shift, such as the shift from an animal denoting entity (*giraffe*) to some kind of artifact that has the shape of the respective animal in (3). This indicates that covert shifts yielding both an animate (1) and an inanimate interpretation (3) are cognitively demanding and that the diverging pattern reported for (2) must be accounted for on separate grounds.

One way to explain the absence of cognitive demands in (2) is the conventionality of this particular shift. Author-for-work alternations are commonly used in English and numerous languages of the world. In turn, salient property-for-person shifts typically rely on a specific contextual setting to license the extended meaning. It has been suggested that this difference has consequences for lexical representation with *Goethe* coming with an underspecified representation, according to which the specific extension is contextually determined on a sentence to sentence basis (e.g. Bierwisch 1988). In contrast, expressions like *ham sandwich* encode a core meaning and require extra effort to carry out the conceptual shift. Conceptual shifts thus come in two flavors, which I would like to term conceptual shifts proper and conceptual alternations. Entities of the *ham sandwich* type that carry a core meaning in lexical representation are concept shifters while entities of the *Goethe* type have undergone lexicalization, which licenses the flexible alternation between concepts. The covert concept shift is computationally demanding because the intended meaning must be constructed ad hoc, while concept alternation is carried out without extra processing cost.

It should also be mentioned that the cost observed for conceptual shifts differs qualitatively from processing demands arising in case of irresolvable type mismatches. This informs the distinction between grammatical and conceptual animacy because purely grammatical feature checking results in a brain signature (N400) different from the operation of conceptual shifting (Late Positivity). The evidence for this comes from electrophysiological data for (4) where the German *wh*-question is marked for animacy ($whom_{\text{person}}$ vs. $what_{\text{object}}$) rendering a mismatch with the predicate's selectional restrictions for an inanimate object. Processing data reveal a negative going signature for the animacy mismatch relative to the onset of the verb, which cannot be resolved because no lexical

information is available to satisfy the type requirement (Weiland-Breckle and Schumacher 2017; see also Weckerly and Kutas 1999; Zhang et al. 2012; for animacy mismatches). In contrast, the answer to this question (2) evoked no effect because as has been argued above the lexical representation makes available the required (object) interpretation.

(4) *Wen hat Sarah gelesen?*
whom$_{person}$ has Sarah read$_{info.object}$
Whom has Sarah read? (Sarah read Goethe.)

The partition between meaning extensions that exert computational demands and alternations that are freely available during composition is also observable with other ontological types. Conceptual shifts/alternations occur frequently and are not confined to shifts in animacy as illustrated by (5–7). In all these cases, conceptual shifts are triggered by the predicate's requirements for a particular type – an artifact in (2/3/6), a human being in (1), something edible in (5) or an event that makes available a reference point in time in (7) – and not associated with animacy per se. The phenomena discussed as covert animacy shifts in the target article therefore should be couched in a broader framework that considers typing as a more general operation (e.g. Asher 2011; or Partee 1987; De Swart et al. 2007 on subtyping and sortal shifts).

(5) Caroline ate the whole plate. (*referring to the content on the plate*)

(6) Joshua handed the water to Natalie. (*referring to the water container*)

(7) Frederik retired after Watergate. (*referring to the event associated with Watergate*)

Considering other type conflicts, the processing-based distinction between conceptual shifts and alternations introduced above is substantiated, indicating that covert meaning alternations are not a uniform phenomenon. On the one hand, certain entities engender computational cost suggesting that a true conceptual shift must be carried out (Leslie 1995). This includes property-for-person shifts (*ham sandwich*), container-for-content shifts (*plate*) and animal-for-statue readings (*wooden giraffe*) (Schumacher 2011; Schumacher 2013). On the other hand, a group of entities does not exert extra cognitive effort in discrete environments, such as author-for-work (*Goethe*), content-for-container (*water*) or place-for-event alternations (*Watergate*) (see Frisson 2009 for an overview over evidence from eye tracking, Schumacher 2013 for electrophysiological data). Based on

these empirical findings, it is therefore essential to distinguish between covert conceptual shifts proper and "shifts" that come about via type selection (what I have termed alternations). The claim that "[c]overt animacy shifts, on the other hand, brought about by selectional restrictions or by the linguistic context in general, do involve a proper type shift in conceptual animacy" (p.1, abstract) is hence too strong and should acknowledge the contrast between conceptual shifts and conceptual alternations.

What is needed to account for conceptual shifts/alternations is first a type system for lexical semantics that represents sortal specifications above and beyond animacy and that secondly also distinguishes between simple type structures and complex type structures. The former are representations of concepts that are unequivocally of a particular type, i.e. have a single core meaning like *ham sandwich*. The complex types are required for concepts that can be subsumed under multiple types. For instance complex types can be represented as dot objects (α•β), symbolizing the availability of two types for a particular concept (Pustejovsky 1995; Asher 2011). Accordingly, the concept of *book* can represent either an entity of the type physical object or of the type informational object (physical object • informational object) and context dependence guarantees that the appropriate type is selected during composition in accordance with the selectional restrictions of the predicate. What has been called underspecified representations above could possibly be represented as a complex type as well (e.g. *Goethe*: person • informational object).

Such a system implies that at least for certain lexical representations a binary contrast is not feasible since certain concepts may come with a dual specification for an animate and an inanimate type. Moreover, within such a framework, animacy might just be a feature contributing to one particular subtype (i.e. person), which could be considered on a par with the other types. Nevertheless the corresponding ontological category seems to have a special status, with entities of the type person being privileged in various respects. In addition, other entities share particular properties with the person category. This calls for a further refinement.

First, conceptual shifts from inanimate entities to animate referents show considerable cross-linguistic variation regarding their acceptability, while the other conceptual shifts discussed above seem to be broadly attested. Second, certain inanimate entities occur in argument positions that typically select animate entities and do not undergo a conceptual shift. To account for these phenomena, a better understanding of the category 'person' is required, which will be linked to agentivity as a core property in human cognition. This move in turn provides us with a finer-grained characterization of inanimate entities.

3 Inanimate entities behaving like animates

Regarding the cross-linguistic validity of shifts from inanimate to animate entities, there seems to be considerable variation regarding the availability of conceptual shifts of the *ham sandwich* type both across and within languages. This could be attributed to morphosyntactic requirements, pragmatic constraints relating to politeness or semantic properties associated with agentivity. An informal survey of about a dozen languages revealed that the *ham sandwich* construction stirred most discussion or yielded infelicity judgments, while there were typically correspondences for the other conceptual shifts discussed above (with the exception that the container-for-content shift was not appropriate in Japanese – but see Schumacher 2013 on conceptual vacuity and extra inferential reasoning associated with this particular shift when no contextual cues point towards the intended content). Hence across languages, many of these conceptual shifts/alternations apply with differing degrees of context dependence, that is, some meaning shifts appear to rely heavily on context and sound odd if presented out of the blue. (As an aside, this may also indicate that what is an alternation in one language, may require a conceptual shift in another language, i.e. the degree of lexicalization may differ across languages.)

While the *ham sandwich* construction is acceptable in some languages (e.g. German, English, Dutch, Italian), there seem to be conceptual restrictions on this shift from an inanimate concept to an animate referent in other languages. For example in Bulgarian, Russian, Turkish, Tamil, Indonesian and Japanese the equivalent of (1) was judged unacceptable. This could be attributed to issues of politeness (i.e. referring to a person by a salient property may appear derogatory and disrespectful), which would not be very illuminating for the current debate. Interestingly, judgments within this kind of shift show further subtle variation. For instance in Russian, the shift from a food item to a person or a medical condition to the associated patient (8a) is unacceptable while shifting a piece of clothing or accessory to an associated person yields a felicitous (yet still pragmatically marked) interpretation (9). Note furthermore that in the colloquial register the suffix *–nik* can be added overtly for the medical context (8b) to express the meaning of 'the person associated with the appendicitis' (Katja Jasinskaja, personal communication). In this particular construction the person reading is composed morphologically before the predicate's selectional restrictions are checked, supporting dS&dH's proposal that overt marking of a type shift does not result in conceptual shifts (p. 3) (but see below for cases of inanimates that do not induce a conceptual shift in contexts without overt marking).

(8) a. *#Appendicit zovet na pomošč.*
appendicitis calls for help
b. *Appendicit-nik zovet na pomošč.*
appendicitis-person calls for help
'The appendicitis calls for help.'

(9) *Sinjaja bluzka vyšla iz komnaty.*
blue blouse walked from room
'The blue blouse walked out of the room.'

Furthermore a potential interference contributing to the unacceptability of the *ham sandwich* shift in certain languages is agreement. In the Tamil equivalent (personal communication, R. Muralikrishnan), the unacceptability may have to do with (neuter) gender marking on the predicate (10) (analogous effects may apply in Polish). In a similar vein, plural antecedents are somewhat cumbersome to process or result in infelicity ((11) from Nunberg 1995), which is further evident in the choice of pronominal coreference. Individuation with its overt grammatical manifestations in number and gender marking thus yields a mismatch effect at the interface of the conceptual system and the grammatical system.

(10) *#Masala-Dosa panam katta*
Masala-Dosa.NOM.SG.N money.NOM pay.INF-PTCP
virumbu-gir-adhu.
like-PRS-3.SG.N
'The masala dosa wants to pay.'

(11) {#Those French fries are/That French fries is} getting impatient.

This however cannot account for the infelicity of this construction in languages without overt gender and/or number marking. The reluctance to carry out this conceptual shift may thus be a reflection of an intrinsic property of the corresponding type: entities of the person type are potential agents and therefore should be capable to instigate actions, act deliberately, show empathy, perceive emotional or sensory input, cause a change of state and so on. Attributing such properties to an expression that is of the artifact type may be particularly cognitively demanding.

This brings us to a second instance of inanimate entities acting as if animate, which crucially do not result in a conceptual shift. Examples for such borderline cases are inanimate forces or machines. Natural forces occur in contexts where they exhibit certain agentive properties as illustrated by (12).

Natural causes are capable of self-contained movement (i.e. they generate their own energy), which is one of the features held by potential agents. Thus while it is possible to utter (12), combining the predicate *batter* with an inanimate entity that typically lacks properties attributed to an agent like the artifact *book* (13) yields an infelicitous reading (unless a causal inference is pragmatically coerced). Hence only a subset of inanimate entities is acceptable as an external argument of the predicate *batter*, calling for a more gradient characterization of inanimate entities. Similarly, machines possess an internal source of motion, which likens them to animate arguments (15).

(12) The storm battered the windows.

(13) #The book battered the windows.

(14) The mob battered the vehicle.

(15) The copy machine / The secretary / #The book printed the letter.

Processing data confirm this division among inanimate entities and indicate that natural forces behave more like animate than inanimate entities. Lowder and Gordon (2015) present eye tracking data that reveal that natural forces pattern with animate entities when processed as external arguments of action verbs and differ from other inanimate entities (instruments) that show increased processing times. Such findings necessitate a more differentiated notion of the underlying category. Animacy as a binary distinction is not powerful enough to account for these fine-grained distinctions among inanimate entities. In turn, agentivity provides a richer and more nuanced characterization. Thus, while the variation observed above cannot be generalized toward an animacy distinction, the involved entities share the property that they are potential (proto-)agents. According to the proto-role approach (cf. e.g. Dowty 1991; Primus 2012), semantic roles can be decomposed into subfeatures. Potential proto-agent features are volition, causation, sentience and autonomous movement. Animate entities typically satisfy these features, i.e. they can act volitionally, experience empathy, etc. (cf. (14)). Inanimate entities like natural forces may carry certain subfeatures of proto-agentivity thus contributing to a well-formed predication (12), while other inanimates do not hold proto-agent features with the consequence that predications fail when these selectional requirements are not met (13).

Critically, in (12) and (15) there is no overt marking of an animacy shift and in dS&dH's proposal only covert realizations of animacy alternations are

predicted to trigger a conceptual shift. However, such a conceptual shift is not apparent in the examples with natural forces and machines, and in fact a shift is not needed when assuming that the predicate does not select an animate argument but rather proto-agent properties. Along these lines, the argument's gradient contribution to agentivity renders overt marking of animacy in these predications unnecessary.

A further example where no overt marking is needed with natural forces – but with other inanimates – is found in Navaho (cf. Comrie 1989). In passive voice, the marker *bi-* is used when the patient outranks the agent in animacy and the prefix *yi-* when the agent is more animate. Both markers occur with natural forces (16a/b), while other inanimates are clearly marked as lower in animacy (17):

> In Navaho, inanimate entities that are capable of spontaneous motion are classified higher than other inanimates, the former including, for instance, wind, rain, running water, lightning. As noted above, when two noun phrases are almost equal in animacy, either the yi- or the bi- prefix verb form can be used; if we take the example 'the lightning killed the horse', then 'lightning' and 'horse' are considered sufficiently close to permit both variants, whereas with 'old age killed my horse', only the bi- version is possible, signalling a P higher in animacy than the A. (Comrie 1989:197)

(16) a. *Ii'ni'* *łí'* *yi-yiisxí.*
lightning horse killed
b. *Łí'* *ii'ni'* *bi-isxí.*
horse lightning killed
'Lightning killed my horse.'

(17) *Shi- łí'* *sá* *bi-isxí.*
my horse old-age killed
'Old age killed my horse.'

Overall such data call for a nuanced differentiation to account for gradient effects of animacy. Previously, hierarchies have been formulated to represent fine-grained distinctions between higher and lower animals or to model differences between natural forces, plants and other inanimate entities and notions like empathy, sentience and autonomous movement have been discussed to account for subtle differences along the animacy hierarchy (e.g. Leach 1964; Silverstein 1976; Comrie 1989; Yamamoto 1999). The evidence presented above indicates that agentivity along with its subfeature specifications provides an effective means to account for variation along the conceptual continuum.

4 Conclusion

Properties associated with animacy map onto discrete ontological types but a three-way division into human beings, animals and inanimate entities using the binary features [± animate] and [± human] cannot account for the subtle patterns discussed above, in particular within the inanimate entities. Instead a more elaborate type system is required (cf. e.g. Asher 2011), in which types further specify semantic properties. Of particular interest for effects relating to animacy are features conferring agentive properties like movement, volition, causation or sentience (cf. the decomposition of semantic proto-roles in the work of Dowty 1991; Primus 2012). In fact agentivity is considered core knowledge of the human attentional system in the cognitive sciences and the identification of cues of agency or self-induced movement are early landmarks in cognitive development (e.g. Leslie 1995). A property-based system provides more flexibility during composition and can model the differences between natural forces and machines on the one hand and other inanimate entities on the other hand. Moreover, within such a type system, the distinction between conceptual shifts and conceptual alternations outlined above can be implemented via simple and complex type representations.

Concerning the distinction between overt and covert animacy and its correlation with absence and presence of conceptual shifts, respectively (proposed in the target article), we have looked at different (apparent) covert realizations and observed a division with respect to conceptual shifting: the *ham sandwich* cases result in a conceptual shift yielding an animate/agentive referent. But natural forces and machines require no conceptual shift because they hold the proto-agent feature [+ autonomous movement] that can satisfy the predicate's selectional restrictions. In fact, under the property-based account advocated here, there is no incompatibility between the predicate and the argument of the type natural force or machine in the examples above. Thus, while an animacy-based approach needs to explain the inconsistent behavior among inanimates, an agentivity-based account predicts no mismatch in these cases (Leslie 1995).

In sum, gradient effects of animacy are best accounted for within a type theoretic framework that implements agentivity-based features. In this way, inconsistent behavior within the group of inanimate entities but also within the group of animate entities can be explained in a homogenous manner.

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