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Distinguishing Coercion and Underspecification in Type Composition Logic

In the newer literature, underspecification and coercion are understood as mechanisms that allow for a conceptually based enrichment of semantic representations. The current theoretical discussion, however, lacks a clear-cut distinction of these mechanisms and their roles. Both these mechanisms have been proposed as tools in the modeling of meaning enrichment in the same empirical domains, i. a. the combination of aspectual verbs with their internal arguments, cf. Egg (2003) vs. Asher (2011), without a genuine comparison of their explanatory force.

Based on data from Spanish and German, we integrate these two mechanisms into one framework: 1) underspecification is a feature of the semantic representation that is deliberately unspecified wrt. certain meaning components leaving space for conceptual and/or contextual enrichment, cf. Bierwisch (1983), Egg (2003) and 2) coercion is a repair mechanism for combinatorial conflicts, cf. Asher (2011). Formally, we implement underspecification by means of a lexically induced underspecified variable, while we adopt Asher's (2011) notion of coercion understood as a pragmatic repair of a combinatorial conflict licensed by a lexical polymorphic type.

We show that both mechanisms are simultaneously necessary in order to account for the full range of combinatorial potential of verbs with their arguments. As a case in point, we chose Spanish *congelar* ('freeze') and its German equivalent *einfrieren*. Asher (2011) argues that *freeze* selects for an internal argument of type LIQUID covering readings like (1a) (compositional case). His analysis also foresees some compositional conflicts (cf. 1b) and allows for the interpolation of a suitable argument licensed by a polymorphic type that is restricted to CONTAINER-type objects (coercion case).

(1) a. El técnico de laboratorio congeló la sangre.
'The lab technician froze the blood.'
b. Mi novio ha congelado las latas.
'My boyfriend has frozen the tins.'

More recently Spalek (2014) expands the picture to cases like (2) where neither Asher's compositional type justification nor his interpolated type adjustment seem to be at work. Spalek claims that Spanish *congelar* has both, the physical reading, as identified by Asher, and an additional abstract reading exemplified by (2). Here, *congelar* selects for an event as internal argument and is interpreted in terms of an interruption of this event rather than a change of a liquid's physical state, cf. (2a) (compositional case). For (2b) we assume that the interpolation of an event happens on the basis of a structured object susceptible of change like *prices* (coercion case).

(2) La OPEP decidió congelar a. la subida de los precios / b. los precios este año.
'The OPEC decided to freeze a. the rise of the prices / b. the prices this year.'

Interestingly, German *einfrieren* shows a parallel variety in the internal argument position. Both physical (3) and abstract (4) interpretations are possible. Additionally, both interpretations allow for a variety of argument types. In fact, (3b) proves that the restriction to CONTAINER-based pragmatic repairs in the physical reading is too strict. The location of a liquid – here: the pasta – seems to be good enough (coercion case).

(3) Ida hat a. den Wein / b. die Pasta eingefroren.
'Ida froze a. the wine / b. the pasta.'

(4) Der Finanzminister hat a. die Unterstützung / b. die Mittel eingefroren.
'The secretary of treasury froze a. the support / b. the funds.'

To account for the richness of observed data we propose a generalized lexical semantics in Type Composition Logic (Asher, 2011) that is capable of accounting for all these naturally occurring verb-object combinations. In our account, physical and abstract interpretations of *congelar/einfrieren* are a matter of lexical underspecification wrt. the resultant state of the event, cf. the underspecified predicate variable P in (5a). Upon combination with an internal argument of type liquid or event, P will be specified either to *solid* or to *interrupted-event*. This is ensured by the general type FROZEN in (5b) that outputs the type SOLID for LIQUID-type internal arguments and the type INTERRUPTED-EVENT for EVENT-type arguments.

Beyond these compositional cases, both *congelar* and *einfrieren* allow for a coercion based interpretation. This is guaranteed by the two polymorphic types within the type presuppositions for the third argument of the predicate *freeze*. *Congelar/einfrieren* selects for either a liquid or an event in the internal argument position. If none of these type requirements are met, a suitable argument can be interpolated along restricted lines. Either, we interpolate a liquid on the basis of a location or an event on the basis of a structured object. Crucially, the semantics only tells us that we introduce a suitably typed variable. The specification of this variable is left to pragmatics.

(5) a. $[\![\text{congelar/einfrieren}]\!] = \lambda\Psi\lambda\Phi\lambda e\lambda\pi\exists s.\ \Phi(\pi{*}\text{ARG}_2^{freeze}{:}\text{AGENT})$
$(\lambda x\lambda\pi_1.\ \Psi(\pi_1{*}\text{ARG}_3^{freeze}{:}\text{LIQUID}{-}\Lambda\iota(\text{HD}(\Psi){\sqsubseteq}\text{LOCATION})$
$\vee\ \text{EVENT}{-}\ \epsilon(\text{HD}(\Psi){\sqsubseteq}\text{STRUCTURED-OBJECT}))$
$(\lambda y\lambda\pi_2.\ \text{freeze'}(e,x,y,\pi_2{*}\text{ARG}_1^{freeze}{:}\text{BECOME}(\text{TY}^{PS}(P))) \wedge$
$\text{result'}(s,e,\pi_2) \wedge P(s,y,\pi_2{*}\text{ARG}_1^{P}{:}\text{FROZEN}(\text{TY}^{+}(\text{ARG}_3^{freeze}))))$

b. General type FROZEN: $(\text{LIQUID} \Rightarrow \text{SOLID}) \vee (\text{EVENT} \Rightarrow \text{INTERRUPTED-EVENT})$

In our account both underspecification and coercion are lexically based. Whereas underspecification is encoded as a lexically introduced underspecified variable in the logical form, coercion is licensed on the type level as a lexically determined repair strategy for type conflicts. Our lexical entry for *congelar/einfrieren* shows that underspecification and coercion are in fact two distinct mechanisms suited for different types of meaning enrichment.

Our case study thus shows that coercion and underspecification work orthogonally and that it is possible and necessary to integrate them into one formal system. We exploit the advantages of Asher's TCL framework where logical form and typing information about the variables are integrated into one representational format. This allows us to differentiate underspecification and coercion not only conceptually but also formally. The study of change of state verbs is especially informative, since it provides an empirical domain where both mechanisms are at work for independent reasons.

References

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