INSTANTIATIONS AND (OBLIGATORY VS. OPTIONAL) ACTANTS

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Abstract: A formalism for the representation of "semantic emphases" is introduced, using principal and accessory instantiations. It makes it possible to convert predicate expressions into network-like structures. As an application criteria for obligatory and optional actants are dealt with.

1. The formal framework

- A set X of objects, denoted by x, y, z.
- A set E of events, states, actions, ..., denoted by e_1, e_2, ...
- A set L of places, denoted by l_1, l_2, ...
- A set T of intervals (spans or moments) on the time axis, denoted by t_1, t_2, ...
- A set of functions f_1, f_2, ..., which are mappings between the sets X, E, L and T.
- A set of relations in E, L and T as e. g. $e_1 \sqsubseteq e_2$ (e_1 is a partial event, ... of e_2, $l_1 \subseteq l_2$, $t_1 \subseteq t_2$, t_1 starts t_2, t_1 finishes t_2 etc. (Allen (1984); Bierwisch (1988) for the general framework).
- Finally a set of primitive semantic predicates B_1, B_2, ..., that may have as arguments elements of X, L and T as well as propositions A, i. e. predicates B with their (appropriate) arguments.

While the elements of the first four sets have the character of variables, the functions, relations and predicates are fixed and interpreted in a characteristic way.

We use here the following functions:
loc(e) = l: The location of e is l.
time(e) = t: The time of e is t.
If e is a path, one may define init(e) = e' and fin(e) = e" (cf. Bierwisch (1988)). One has time(init(e)) starts time(e) etc.

We will use the following predicates:

ACT(x)	CAUSE(A_1,A_2)
HAVE(x,y)	CHANGE(A_1,A_2) (from A_1 to A_2)
NOT(A)	ET(A_1,A_2) (conjunction)
BECome(A) $\overline{\text{def}}$	CHANGE(NOT(A),A)

On the basis of these formal components one has to give a definition of wellformed expressions. One needs furthermore an axiom system expressing the fundamental properties of the predicates. We skip this here.

2. Instantiations

For each proposition A we assume an additional argument place that is filled in by an element e of E. We say that "e is an instantiation of A" or "e instantiates A" and write A[e] (Bierwisch (1988), Reichenbach (1948)).

We introduce here a distinction between two types of instantiations, namely
- principal instantiations, representing a semantic emphasis, denoted by e^p,
- accessory instantiations, denoted by e^a.

For each primitive predicate in a given inventory one instantiation rule has to be formulated. The rules are applied recursively and provide a means for "calculating" the instantiations for complex propositions. The results are network-like structures consisting of conditions only on the level of the sets X, E, L and T.

ACT(x)[e]: e is an action of x.
HAVE(x,y)[e]: e is a state, that involves x's having (owning, ...) of y.
NOT(A)[e]: a condition, that implies $\sim$A[e].
It should be noted that for concrete A's concrete rules can be formulated (preserving presuppositions and certain arguments).

In the next rules the index i = 1,2 indicates whether the first or the second argument yields the principal instantiation. For the index j = 1,2 we use the convention "j ≠ i".

$\text{CAUSE}^i(A_1,A_2)[e]$:
(e is a pair (e_1,e_2)) $\wedge$ ($A_1[e_1]$) $\wedge$ ($A_2[e_2]$) $\wedge$
(e_1 causes e_2) $\wedge$ ($e_i = e^p$) $\wedge$ ($e_j = e^a$) $\wedge$
(time(e_1) = time(e_2) = time(e)) $\wedge$
(loc(e_1) = loc(e_2) = loc(e))
This is the rule for simultaneous causation

where one has unity of time and place.

$CHANGE^i(A_1,A_2)[e]$:

$(e \text{ is a path}) \wedge (init(e) = e_1) \wedge (fin(e) = e_2) \wedge (ET^1(A_i,NOT(A_j))[e_i] \wedge ET^*(A_j,NOT(A_i))[e_j] \wedge (e_i = e^p) \wedge (e_j = e^a)$

This preserves the semantic emphasis on A_i and allows a new index for the second ET. From this rule one obtains the conditions for

$BEC^1(A) = CHANGE^1(NOT(A),A)$ (=CEASE(NOT(A)))

$BEC^2(A) = CHANGE^2(NOT(A),A)$ (usual BEC(A)).

Note that $ET^k(A,A)[e]$ eq $A[e]$ for all k, A and e, BEC has one "degree of freedom" less.

$ET^i(A_1,A_2)$ e :

$(e \text{ is a pair } (e_1,e_2)) \wedge (A_1[e_1]) \wedge (A_2[e_2]) \wedge (e_i = e^p) \wedge (e_j = e^a) \wedge$

$(time(e_1) = time(e_2) = time(e))$

This way ET becomes an unsymmetric predicate.

3. Instantiations and actants

We illustrate the notions defined above by a sample of German verbs with three necessary actants: the source x, the goal z, and the (transferred) object y. Under some simplifications we may assume the following expression-scheme as basic pattern for this group:

(1) $CAUSE^{1/2}(ACT(x/z), CHANGE^{1/2}(HAVE(x,y),HAVE(z,y)))$

In (1) 16 expressions are summarized, which one may obtain by choosing the upper index of CAUSE, the argument of ACT, the upper index of CHANGE and the upper index of the second occurrence of ET in the $CHANGE^i$-rule.

An occurrence of a predicate in an expression representing a certain sememe is called an inherent occurrence, if this occurrence has to be instantiated for a sufficient description of this sememe. The inherent occurrences have to fulfil some conditions:

- The inherent occurrences are closed under principal instantiations: If B(...,A,...) is an inherent occurrence of B, and the predicate A yields the principal instantiation of B, then the uppermost predicate of A is an inherent occurrence.
- The inherent occurrences are closed bottom-up: If in B(...,A,...) the occurrence of the uppermost predicate of A is inherent, then the occurrence of B is inherent.

In (1) it is sufficient to mark (after their instantiation) both occurrences of ET as primarely inherent occurrences (i. e. init(e) and fin(e) are necessary). For concrete sememes one may add further inherent occurrences in accordance with the aforesaid conditions. The possibilities depend on the distribution of principal instantiations.

Each element of X occurring in an expression a role can be assigned to:

- ACT( ) defines in (1) the role "agent".

By spelling out the second argument of CAUSE in (1) without the details of instantiations we obtain four partial conditions:

$HAVE(x,y)[init(e)] \wedge NOT(HAVE(z,y))[init(e)]$

$NOT(HAVE(x,y))[fin(e)] \wedge HAVE(z,y)[fin(e)]$

Here e is the instantiation of CHANGE.

- The occurrences of x in the first and the third partial expression define together the role "source" for x.
- The occurrences of z in the second and the fourth partial expression define together the role "goal" for z.
- The occurrences of y in the first and the fourth partial expression define together the role "object" for y.

In this sense we may speak of role defining occurrences. They are independent of the distribution of the types of instantiations.

Now we are able to formulate the following principle:

(2) An actant is obligatory in a certain role iff all its defining occurrences for this role are direct arguments in inherent occurrences of predicates.

In order to avoid mixing up surface and deep phenomena one should note that the arguments of ACT in (1) for the verbs considered under A. - H. are subjects (in active voice) and hence "obligatory". This assignment predominates over (2) in passive voice, too: In C. the actant z e. g. is according to (2) obligatory as goal and agent, but being the subject in active voice, not obligatory in passive voice. The same applies for the subjects in passive voice.

In (3) we list the first eight possibilities of (1) with the following abbreviations in the corresponding columns:

1. upper index of CAUSE
2. argument of ACT
3. upper index of CHANGE and the first ET
4. upper index of the second ET
5. distribution of source, object and goal according to (2) (optional: in brackets)

6. the principal instantions within the predicate CHANGE express an emphasis on
BEC(NOT(HAVE(x,y))) : from
BEC(HAVE(z,y)) : to
one argument of CHANGE: from to

7. distribution of the actants taking into account the agent in active voice

(3)	1.	2.	3.	4.	5.	6.	7.
A.	1	z	1	2	(x)y(z)	from to	(x)y z
B.	1	z	1	1	x(y(z))	from	x(y)z
C.	1	z	2	2	((x)y)z	to	((x)y)z
D.	1	z	2	1	(x)y(z)	from to	(x)y z
E.	1	x	1	2	(x)y(z)	from to	x y(z)
F.	1	x	1	1	x(y(z))	from	x(y(z))
G.	1	x	2	2	((x)y)z	to	x(y)z
H.	1	x	2	1	(x)y(z)	from to	x y(z)

These eight possibilities refer to the following German verbs (among many others):

A. wegnehmen, abnehmen (take away/off), entwenden (pilfer, filch)

(4) Die Oma nahm (dem Baby) die Schere weg.

(5) Er hat (der alten Frau) den schweren Koffer abgenommen. (so she needn't carry it)

B. bestehlen (rob, steal from)

(6) Er hat die Frau (um 1000 Mark) bestohlen.

C. stehlen (steal)

(7) Er hat ((der Frau) 1000 Mark) gestohlen.

D. annehmen (accept), borgen (borrow)

(8) Er hat (von der Frau) 1000 Mark geborgt. (so he has some money now)

E. verschenken (give away), abgeben, ausgeben (give out, spend), ausliefern (deliver), verleihen (lend (out))

(9) Gebe junge Katzen ab! (somebody wants to get rid of the kittens)

(10) Hans hat das Spielzeug (an die Kinder) verschenkt. (so he has no toys any more)

F. liefern (deliver)

(11) Die Firma liefert ((uns) das Papier).

G. beschenken (present s. o.), beliefern (furnish, supply)

(12) Hans hat die Kinder (mit Spielzeug) beschenkt. (so they have some toys now)

(13) Die Firma beliefert uns (mit Papier).

H. schenken (make a present of s. th. to s. o.), leihen (lend, not borrow)

(14) Hans schenkte (den Kindern) Spielzeug.

There is some support for 6. in (3) by

- the resultative aspect (a clear difference between A. and D. and between E. and H., on the other hand a great similarity between A. and E. and between D. and H.),
- the prefixes, forming three types ("from", "over" and "to" except be-, ver-, ...). In German exists a rich system of prefix-derivatives in this group, their detailed examination confirmes the distinctions proposed here. Verbs like übernehmen (take over) or übergeben, überreichen (hand over) belong to both from-to-cases A. and D. or E. and H., respectively.

The remaining eight cases (upper index of CAUSE is 2) represent the passive voice of A. - H. and some other verbs, e. g.

H* bekommen, erhalten (receive)

(15) Die Kinder bekamen (von Hans) Spielzeug.

The distribution (x)y(z) (under 5.) turns into (x)y z (under (7.). For these verbs the passive voice is impossible.

Just the basic verbs nehmen and geben (and some more, e. g. übergeben) do not meet the scheme in every detail: They may occupy several positions of show a different distribution or optional actants. It goes without saying that for many of the considered verbs the expression (1) has to be specified, i. e. HAVE is too general. Moreover stealing is against the law, presenting is connected with some benefit of z etc. ...

The classification of this verb group is in keeping with Schumacher (1986), p. 721 ff. Other groups of verbs (e. g. "informing": mitteilen, ..., erfahren) have been dealt with the same way. Pairs of the type to fill the bottle with water and to fill water into the bottle yield another confirmation of this formal approach.

References

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