The role of functional concepts in the classification of nouns and verbs

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1. Introduction

Goal of the paper: economic and unitary classification of both nouns and verbs.

We take a different perspective from that in the previous literature (e.g., Dowty 1979, Smith 1991, Rothstein 2004), where the primary focus is on aktionsart and aspectual semantics. Furthermore, unlike Jackendoff (1990, 1991) and Talmy (2000), who rely exclusively on conceptual features, our classification is designed along conceptual and grammatical features.

Innovations: – exploitation of the role of functional concepts for both nouns and verbs
– systematic characterization of transitions between the classes

Claim: polysemy with verbs is restricted to variance of no more than one feature specification. Meaning variance involving more than one feature is overtly marked.

2. Classification of nouns according to Löbner (2005)

	non-unique reference	unique reference
monadic	sortal concepts (SC) *dog, table, adjective, water*	functional concepts (FC1) *sun, weather, Mary, prime minister*
polyadic	relational concepts (RC) *sister, leg, blood, modifier*	functional concepts (FC2, FC3) *father, head, age, subject; difference*

The monadic/polyadic distinction concerns the syntactic requirement of realizing a possessor argument.
– The meaning of noun used as a sortal concept is a one-place predicate, with no limit as to the number of the potential referents of the noun.
– The meaning of a relational noun is a two-place predicate, specifying its potential referents by relating it to a possessor. Again, there is, in principle, no limit as to the number of the potential referents.

The unique/non-unique distinction is a referential one. We may say that a noun is used as a functional concept if its reference is inherently unique. We are thus dealing with a mathematical function:
– For FC2s, a (pair of context and) possessor will be assigned exactly one referent.
– For FC1s, a context will be assigned exactly one referent.

3. The proposal

The system we propose elaborates on Löbner's classification so as to also account for (i) the count/mass-distinction and (ii) verbs.

3.1 Extension by the count/mass-distinction

count nouns (individual nouns) refer to discrete objects: *car*, *animals*, *house*, *mother*
mass noun refer to substances or masses: *water*, *flour*, *mud*, *gold*
The distinction does not concern a given noun as such, but rather its use as either individual concept or mass concept: *We ate many / much cake(s); There is dog all over the road*. [NB: collectives such as *cattle, foliage, family* exhibit mass noun behaviour. Conceptually, however, they differ from substances in that they are aggregates of discrete objects, and therefore pattern with count nouns rather than with substance nouns.]

3.2 The features

The features we propose are binary, and they immediately reflect <u>markedness</u>, such that positive specifications encode the presence of a property, whereas negative specifications encode its absence.

[+structured]:
A noun/verb is [–structured] iff its referent is divisible. Divisibility: applicability of a noun predicate (or verb predicate, respectively) to arbitrarily small parts of a quantity (or situation, respectively).
For nouns, the feature may be paraphrased as 'discrete'. For verbs, the feature may be interpreted as 'dynamic' (as opposed to 'stative'). Divisibility applies in exactly the same way as with nouns: divisibility = applicability of the same verbal predicate to arbitrarily small intervals of time. E.g., *run* is not applicable to an interval that is smaller than a single step takes (see Taylor 1977, Dowty 1979; Katz 1995), and is therefore [+structured], as opposed to *stink*.

[+transitive]: A structural argument must be realized in the syntax.
For nouns: possessor ('genitive')
For verbs: direct and indirect object (as opposed to oblique arguments)

[+functional]: functional uniqueness
For nouns: functional concepts, i.e., each World/Time coordinate is assigned a unique referent.
For verbs, arguments are assigned a value along a dimension encoded by the verb. A dimension is a function that provides each (sortally appropriate) individual with a value, to be understood as an object defining property (Kaufmann 1995).

The 8 classes resulting from the 3 binary features are inherently ordered in a lattice structure along the notion of markedness, which is reflected by 'plus' specifications.

4. Resulting classification for nouns

4.1 Object denoting nouns ('upper half of the cube'; basically: count nouns)

[–trans, +struc, –func]: 'count' SC (*a table*). Semantically: one-place predicates over individuals.
also: collectives/aggregates with internal structure, for which divisibility does not hold: *Vieh/cattle*, *Laub/foliage*

[+trans, +struc, –func]: 'count' RC (*a friend of mine*). Semantically: relations between individuals.

[–trans, +struc, +func]: 'count' FC1 (*the sun, the pope, the temparature in Berlin at noon*). Semantically: functions from World/Time configurations onto entities.

[+trans, +struc, +func]: count FC2 (*his mother, the weight of the table*). Semantically: functions from (pairs of World/Time configurations and) individuals onto entities.
also: collectives/aggregates such as *my family*

4.2 Substance denoting nouns ('lower half of the cube')

[–trans, –struc, –func]: substance SC (*water, wood*)
sortal concepts in the same way as sortal count nouns, their +struc counterparts: quantities (or 'kinds'); here: substances are distinguished (*there is water, there is wood*)

[+trans, –struc, –func]: substance RC (*blood, milk*)
substances with a possessor: *blood of an alligator; milk of/from the cow, wine of the Rioja region*

[–trans, –struc, +func]: substance FC1 (*the air; the water, the wood*)
reference determined by situational argument: *the air in Berlin*
exhaustively conceptualized substances, either quantifying, or anaphoric, or generic use: *the (entire) water*

[+trans, –struc, +func]: substance FC2 (*my blood, the water of the Rhine*)
p-argument yields exhaustively conceptualized, or bounded, substance reading, either quantifying, or generic: *the blood of an alligator; my flour*

There seem to be no 'born' members of [–struc, +func], probably because cumulativity and functionality are not logically independent of one another: 'boundedness' is introduced when a mass noun is used as a fuctional concept
the latter is implied by the former.
(similar effect to the one that is brought about by classifiers).

4.3 Markedness

- The choice of the feature [+struc], rather than the reverse '–homogeneous', captures the fact that mass nouns have less semantic contents than count nouns. They lack a criterion for counting, which is only established by count unit words such as *piece, sheet*. Only [+struc] nouns can denote individuals. Corollary: obligatory use of articles.

- [–func] does not require syntactic definiteness, mostly accompanied by the definite article, whereas [+func] does.

- The poles:
   [–trans, –struc, –func] never occur with articles.
   [+trans, +struc, +func] are the most complex concepts: only a few body and kinship terms (for which functionality is contingent rather than necessary) as 'born' members. Dimensional expressions are typically derivations or loans (*Gewicht/weight; Geruch/smell, odour; Temperatur/temperature*)

5. Resulting classification for verbs

5.1 Dynamic verbs / events ('upper half of the cube'):

[–trans, +struc, –func]: unergatives (intransitive activity verbs), e.g., *laufen/run, arbeiten/work*
– intransitive by definition
– internal structure because of dynamicity, usually agentivity: the predication is not possible over arbitrarily small intervals. E.g., *run* does not hold true for a temporal interval which is smaller than one step takes ⇒ no divisibility ⇒ no homogeneity.
– not functional, since no object defining dimension is specified: one doesn't need to *run, swim,* or *drive*, etc. and can still be an individual capable of moving.

[–trans, +struc, +func]: unaccusatives (change of state verbs), e.g. *sterben/die, schmelzen/melt, wachsen/grow*
– intransitive by definition
– internal structure (dynamic), because a change of state is involved
– functional, since these verbs encode a dimension, according to which for any (sortally relevant) individual there must always be a value. E.g., every physical object has an aggregate state, and *melt* characterizes the post-state as fluid.

[+trans, +struc, +func]: causativized change of states (*öffnen/open, töten/kill*), resultatives
– transitive by virtue of causativization. Mostly derived by introduction of causation
– internal structure, since like with unaccusatives, a change of state is involved.
– functional, because they decompose into a causation and a change of state, like with unaccusatives: for the referent of the object (and not for that of the subject), a change of state is encoded along a certain dimension.

[+trans, +struc, –func]: transitive events (*hit, read, give, lose*)
– transitive; often effect on object referent
– internal structure, since the predication does not hold true of arbitrarily small intervals. E.g., *eat* is not appropriate for only opening one's mouth.
not functional: either (i) no dimension is encoded, neither for the subject nor for the object referent; or (ii): transitive and ditransitive verbs such as the verbs of change of possession *geben/give, verlieren/lose* type (also: *zeigen/show, beibringen/teach*): *give* encodes a change of state for the indO (the recipient), who gains possession of the dirO – not functional, since POSS is not a deterministic relation: one can possess several things. Likewise, *verlieren/lose* is not functional because the subject referent is involved in the change, but may have lost several things.

⇒ All dynamic verbs/events form a natural class parallel to that of object denoting nouns, while state verbs are parallel to substance denoting nouns.

5.2 States ('lower half of the cube'):

[–trans, –struc, +func]: intransitive dimensional state verbs, stative verbs, position verbs
wiegen/weigh, kosten/cost, heißen/be called; groß/large; stehen/stand, sitzen/sit, liegen/lie.
– intransitive (specifications of values do not have the status of a direct object: *einen Euro kosten*)
– no internal structure: mere state predications, over arbitrarily small intervals
– functional: either explicit specification of value (*cost 1 Euro, smell of coffee*), or inherent value assignment, as in *stink,* German *duften* 'smell nice', verbs of emission such as *glänzen/glitter, glimmen/glow, quietschen/squeal,* verbs of sensation (*schmerzen/ache, jucken/itch, drücken/press*), developmental stages (*blühen/blossom, welken/wilt; pubertieren* 'to be in puberty'), position verbs
also: dimensional adjectival concepts; in, e.g., Indo-European languages realized as a syntactic category of their own, in many others, such as Lakota and Korean, by stative verbs.

[+trans, –struc, +func]: transitive dimensional state verbs
gehören/belong, bewohnen/inhabit, stative use of *bevölkern/inhabit, beschreiben/describe, etc.* (*The novel tells the story of Jean-Baptiste Grenouille.*)
– transitive, object typically denotes a non-affected individual
– no internal structure: mere state predications, over arbitrarily small intervals
– functional, since the referent of the object is the value that is assigned to that of the subject. E.g., *gehören/belong* specifies the dimension of ownership

[+trans, –struc, –func]: transitive state verbs
haben/have, besitzen/possess, innehaben/hold (a PhD, etc.*), enthalten/contain, umfassen/comprise, verdecken/cover;* verbs of perception and experiencer verbs: *kennen/know; sehen/see, schmecken/taste; fürchten/fear, bewundern/admire; überwiegen/outweigh, übertreffen/surpass*
– transitive object denotes a non-affected individual, but passive is possible for most of them
– no internal structure: exclusively state predication
– not functional: an attribute such as possession allows for more than one value (*besitzen/possess*), in contrast to the reverse relation (*belong to*); likewise: *beherrschen/rule over*: the Romans used to rule over Germany, but over Gaul as well.

[–trans, –struc, –func]: non-functional stative verbs
copular verbs; *existieren/exist*; *betragen, sich belaufen/amount, total*; static light verb uses such as *(zur Debatte) stehen/* 'to be at issue'
– intransitive
– no internal structure, since the predication holds for arbitrarily small intervals, no event structure
– not functional, since no dimension is encoded.
Comprises those verbs that are the most de-semantisized ones, extreme case: no predication of their own (rather, mere grammatical function of mediating, e.g., predicative adjectives).

5.3. Grammatical criteria

● ±struc: captures the static vs. dynamic distinction. This distinction is motivated by a series of tests (discussed, e.g., in Katz 1995) such as the availability of imperative, progressive, embedding under certain control verbs (*persuade*).

● ±trans: distinguishes verbs with a direct object (more precisely: object with structural case) from those without a direct object (intransitive, or with an obliques object); prerequisite for passivization (for those languages that do not allow for impersonal passive).

• ±func: the grammatical relevance of this feature is best pointed out in connection with the above features for the individual classes:

[–trans, +struc, +func] vs. [–trans, +struc, –func]: captures one of the most vividly discussed distinctions, viz. that between two classes of intransitive verbs, which exhibit clear grammatical asymmetries: *sein* vs. *haben-* perfect auxiliary, accessibility of impersonal passive, agent-*er*-nominalization, and attributive use of past participle.

unergative: <u>hat</u> *gearbeitet,* $^{\sqrt{}}$*hier wird gearbeitet,* $^{\sqrt{}}$*der Arbeiter, *die gearbeiteten Studenten*

unaccusative: <u>ist</u> *geschmolzen, *hier wird geschmolzen, *der Schmelzer,* $^{\sqrt{}}$*das geschmolzene Eis*

Corrolary: nominalizations of unaccusatives are relational functional concepts (*Wuchs/growth, Ankunft/arrival, Schmelze/melt, death*), whereas nominalizations of unergatives can much more easily be used as sortal concepts (*a work, a dream, a run, a dance*).

[+trans, +struc, +func] vs. [+trans, +struc, –func]: distinguishes dimensional transitive achievements/accomplishments from non-dimensional transitive activities.

Our diagnostic: event nominalization is available for the former class only, thus *nach der Öffnung des Safes/Ermordung Cäsars/Verbreiterung des Weges* (lit. 'after the opening of the safe/killing of Cesar/broadening of the path') vs. **nach der Erklärung der Theorie/Schreibung des Buches/Trinkung von Alkohol/Vergessung des Namens/Erkennung der Melodie* (lit. 'after the explanation of the theory/writing of the book/drinking of alcohol/forgetting of the name/spotting of the melody).

⇒ possible, if the genitive argument is provided with a value along an object-defining dimension.

Note that the asymmetry cannot be captured by the feature [±telic], which is used, among others, by Van Valin & LaPolla (1997), Rothstein (2004).

[–trans, –struc, +func] vs. [–trans, –struc, –func]: verbs that denote object defining properties allow for a value specification: either by gradation of the verb (*stark glänzen* lit. 'shine strongly'*, sehr schmerzen/hurt a lot*) or by a degree phrase (*eine Tonne wiegen/weigh a ton*) vs. **sehr existieren/*exist a lot.*

[+trans, –struc, +func] vs. [+trans, –struc, –func]: nominalization with transitive states is only available for +func, thus *Bewohner/inhabitant, Bevölkerung/population, Beschreibung/description, belongings, Erzählung/tale* vs. **Umfasser/*compriser, *Schmecker/*taster, *Seher (des Fehlers)/*seer (of the mistake), *Fürchter/*fearer.*

Crucially, *verdecken/cover* nominalizes into *Verdeck/cover*, but clearly takes a functional meaning: an album typically has one (esp. designed) cover. *Besitzer/possessor, Halter/holder* is possible because the verb is deterministic, w.r.t. the object referent (which is the reason for not classifying it as +func) ⇒ functional nouns. Generalization: nominalizations with stative verbs are posssible if either the verb is functional, or the result is a functional concept.

(Note that this asymmetry cannot be captured by the notion of agentivity!)

Additional justification for [–trans, –struc] as a natural class: it is commonly assumed that intransitives divide exhaustively into unergatives and unaccusatives. Stative verbs, however, cannot unambiguously be assigned according to the major criteria: *hat existiert, geglänzt, gequietscht, *die geglänzte Oberfläche*, but **Existierer, * Glänzer, * hier wird gequietscht*. The existence of another class of intransitives is thus correctly predicted by our system.

5.4. The poles

- [–trans, –struc, –func] is the class with the least semantic content (copula verb *be*: purely grammatical, no predication of its own)
- [+trans, +struc, +func] is the class with the richest semantic content: argument structure, causation (giving rise to complex event structure, comprising pre- and post state), and dimensionality.

6. Transitions between verb classes

Our claim: different conceptual variants (i.e., polysemy) are only possible if they involve no more than one feature change (i.e., stepwise, 'along edges of the cube'). Direct ‚diagonal' transitions require morphological marking.

6.1 One feature change: may occur without morphology = polysemy

[–trans, +struc, –func] ↔ [+trans, +struc, –func]:
→ transitivization with unergatives (*den Tango tanzen/dance the tango*)
← passive; object deletion/antipassive: *Sie liest, isst ... gerade/She's just reading, eating ....*

[–trans, +struc, +func] ↔ [+trans, +struc, +func]:
→ causativization of unaccusatives. Morphologically unmarked: *das Eis schmelzen/melt the ice.* (Overtly: *fallen/fall* → *fällen/fell, sinken* → *(ver)senken* 'sink')
← decausativization, e.g. by reflexivization: *sich öffnen* 'open'

[–trans, –struc, +func] ↔ [–trans, +struc, +func]:
→ "inchoativization", a stative dimensional verb is supplemented by a transition from a pre-stage, giving rise to an unaccusative: 'blossom', German: *blühen* → *erblühen*.
← "stativization" of an unaccusative: *die Straße fällt ab* 'the road falls away' ← *die Flügel fallen ab* 'the wings fall off'.

[–trans, +struc, –func] ↔ [–trans, +struc, +func]:
→ aspect composition of unergatives with goal into unaccusatives: *ins Zimmer tanzen/dance into the room*; by verb particles: *dösen/doze* → *eindösen/doze off*
← agentivization (attribution of control): *Es wurde gefallen* lit. 'It was fallen' (deliberately)*.*

[+trans, –struc, –func] ↔ [+trans, +struc, –func]:
→ psych verbs into agentive verbs: *feel the pulse, hear the prayer, (go and) see s.b.*
← metonymies into figure-ground- and psych verbs: (*emotional berühren/touch emotinally, ergreifen/seize; Die Hecke umfasst, umrahmt den Garten/The hedge encloses, frames the garden.*)

[+trans, –struc, +func] ← [+trans, +struc, +func]: metonymies involving localization: *Die Straße führt direkt zum Bahnhof/The road leads directly to the station.*

[+trans, –struc, –func] → [+trans, –struc, +func]: pragmatic shifts (quantity maxim, exhaustivity): meaning of *Die Schublade enthält einen Revolver/The drawer contains a revolver* from ‚among other things' → ‚exclusively'.

6.2. Several feature changes: overtly marked operations

[+trans, –func] → [–trans, +func]: passivization of, e.g., verbs of possession (*gehalten werden*)

[+trans, +struc] → [–trans, –struc, +func]: modalization („middle voice"), through degree specification and (in German) reflexive: (*Das Buch verkauft sich gut.* 'The book sells easily.')
[–trans, –struc, +func] ← [+trans, +struc]
← "stativization" as in the 'Zustandspassiv': *Der Laden ist geschlossen/The shop is closed.* For transitive events even [+func] ← [–func]: *Die Äpfel sind gewaschen/The apples are washed.*

[–trans, –struc, +func] → [+trans, +struc, +func]: causativization. Positional verbs with weak sup-pletion (*liegen/lie* → *legen/lay, sitzen/sit* → *setzen/seat, stehen* 'stand' → *stellen*); adjectives through *ver-/en*, umlaut, comparative-*r* (*groß sein/be large* → *vergrößern/enlarge, breit sein/be broad* → *verbreitern/broaden, kurz sein/be short* → *kürzen/shorten*)

[–trans, –struc, +func] ← [+trans, –struc, –func]: stimulus subject, experiencer deletion through verb particle (and reflexivization): *aussehen nach* 'look like' ← *sehen* 'see'*, sich anhören nach* 'sound like' ← *hören* 'hear'*, sich anfühlen nach* 'feel like' ← *fühlen* 'feel'.

[–trans, +struc, –func] → [+trans, +struc, +func]: strong resultatives through adjectives or verbal particles (*den Rasen plattlaufen/run the lawn flat, die Schulden abarbeiten/work off ones debt*)

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