## Classifiers are for count nouns: evidence from Hungarian

Kata Wohlmuth (UPF) & Brigitta R. Schvarcz (Bar-Ilan University, Afeka College of Engineering) In mass/count languages sortal classifiers (CLs) do not occur with count nouns, while in classifier languages numerals always precede a CL (Chierchia 1998, 2010). Hungarian poses a problem for such categorizations and shows that a classifier system and a mass/count system are not mutually exclusive. We argue that in Hungarian CLs are required by the noun that has to have Maximally Strongly Self-Connected (Grimm 2012) entities in its denotation. The role of the CL is to specify the domain of counting for the numeral.

**Background.** A generally accepted way to diagnose a noun either as count or mass is to test whether it can be directly modified by a numeral (Chierchia 2010). Nouns that can be directly modified by a numeral (Num+NP constructions) are count nouns (see (1)), and nouns that have to be in the complement of a CL-word to combine with numerals are mass nouns (see (2)).

(1) three (#pieces of) books (2) three \*(pieces of) gum

In Hungarian, many nouns can be directly modified by a numeral, but can also occur in CL-constructions; see (3). Here we will call these nouns mixed nouns.

(3) *három (darab) könyv* 'three books'

three (CL<sub>unit</sub>) book

There are two assumptions based on the behavior of mixed nouns: ASSUMPTION 1: mixed nouns are mass nouns, and always combine with an overt CL or null-CL before combining with a numeral (Csirmaz & Dékány 2014). ASSUMPTION 2: mixed nouns are ambiguous, and they can be either count or mass (Schvarcz & Rothstein 2017).

**Our hypothesis.** CLs have lexical content, and when combining with a noun, they impose a requirement to be fulfilled by the entities in the noun's denotation. Thus, the function of the CL is not yielding a count predicate from a mass noun, but to specify the domain of counting.

**Key observations.** <u>The first observation</u> to motivate our hypothesis is that mixed nouns are compatible with different interpretations in Num+NP constructions than in CL-constructions. In the case of *könyv*, lit. 'book', the noun has both so-called informational objects (as in *an interesting book*) and physical objects (as in *a thick book*) in its denotation (Asher 2011). When *könyv* is directly combined with a numeral, it can count objects of either type; see (4). However, if *könyv* occurs in a CL-construction, the numeral can only count of physical objects; see (5) and (6). This meaning shift of the NP is unexpected if we follow either of the two aforementioned assumptions about mixed nouns.

- (4)  $h\acute{arom} k\ddot{o}nyv$  'three books (INF, PHYS)' (5)  $h\acute{arom} darab k\ddot{o}nyv$  'three books pHYS' three CL<sub>unit</sub> book
- (6) Amelia írt három (#darab) könyv-et a spenót-ról.
  Amelia wrote three CL<sub>unit</sub> book-ACC the spinach-DELAT 'Amelia wrote three books about spinach'

<u>The second observation</u> is that nouns that are ambiguous between being notionally count or mass, like fa, lit. 'tree' or 'wood', display the ambiguity in CL-constructions (see (8)), but are incompatible with the mass interpretation in Num+NP constructions (see (7)).

(7) *öt fa* 'five trees'
 (8) *öt darab fa* 'five {trees, pieces of wood}'
 five tree/wood
 five CL<sub>unit</sub> tree/wood

Cases like fa are problematic for both of the two assumptions for the following reason: we have to assume that there are two lexical entries for fa, both of them are mass, but only one of them can occur in Num+NP construction (Csirmaz & Dékány 2014), or is ambiguous between being count and mass (Schvarcz & Rothstein 2017). While both assumptions comply with the data, neither of them provides any insights on how the denotations of  $fa1_{mass}$  and  $fa2_{mass}$  differ, and why only one of them is compatible with the null-CL or has a count counterpart.

**Proposal.** We assume that cardinal numerals in Hungarian are interpreted as predicates of type  $\langle e, t \rangle$ , and they give the cardinality of an entity (Landman 2003); see (9-a). In our system, the cardinality of an entity is understood as the cardinality of the set containing all the parts of the entity that are the smallest elements in the denotation of a given predicate; see (9-b).

(9) a.  $[\![n]\!] = \lambda x. |x| = n$ 

b.  $|x| = n \leftrightarrow |\{y : y \le x \land \exists P.P(x) \land P(y) \land \neg \exists z.z < y \land P(z)\}| = n$ 

Nouns can combine with numerals directly. In a Num+NP construction, the numeral gives the cardinality of an entity in the denotation of the nominal predicate in the sense of (9-b). Num+NP constructions are semantically well-formed only if the numeral combines with a predicate that has atomic entities in its denotation, that is, when the noun has count denotation.

Based on (4)–(8), we assume that *darab*, ' $CL_{unit}$ ', in CL-constructions imposes a restriction on the parts of the entity to be counted by the numeral: they must be distinct in the physical sense. We capture this intuition by analyzing *darab* as a predicate modifier which takes a predicate over entities, and returns a predicate that holds of any entity that is the sum of Maximally Strongly Self-Connected (see Grimm 2012) entities with respect to the predicate; see (10).

(10)  $\llbracket \text{DARAB} \rrbracket = \llbracket \text{CL}_{unit} \rrbracket = \lambda P \lambda x \cdot P(x) \land x = \bigoplus \{y : y \le x \land \text{MSSC}(y, P)\}$ 

By analyzing *darab* as in (10), we can capture the shift in interpretation observed in (4) and (5). The Num+NP construction is underspecified as to what kind of entities in the denotation of the NP are counted, they just need to be atomic in the sense of (9-b). That is, the entity denoted by the noun *könyv* in (4) can have informational objects or physical objects as its parts, and either of them can be counted by the numeral; see (11). In (5), however, the entity denoted by *könyv* can only have physical objects among its part, as *darab* requires the entity to consist of parts that exist in physical space, otherwise the MSSC-property cannot apply to them. As a result of that, the numeral can only count physical objects, but not informational objects; see (12).

(11)  $[[(4)]] = \lambda x.*BOOK(x) \land |x| = 3$ 

(12)  $\llbracket (5) \rrbracket = \lambda x.*BOOK(x) \land x = \bigoplus \{y : y \le x \land MSSC(y,*BOOK)\} \land |x| = 3$ 

Our analysis of *darab* in (10) can be straightforwardly extended to other CLs in Hungarian like *szem*, 'CL*small round object*', *fej*, 'CL*big round object*', etc., which select nominals based on size and shape of the entities in their denotation. These CLs can be analyzed as lexically more specified versions of *darab*, each of them adding some extra property to be fulfilled by the parts of the entity that is counted; see the lexical entry for *szem* in (13).

(13)  $[CL_{small round object}] = \lambda P \lambda x. P(x) \land x = \bigoplus \{y : y \le x \land MSSC(y, P) \land SMALL(y) \land ROUND(y)\}$ By assuming that the MSSC-property is imposed by the CL, our analysis correctly predicts that the parts counted in CL-constructions cannot be kinds denoted by the noun, whereas in Num+NP constructions it is possible to count kinds or subkinds (see Schvarcz & Nemes 2019).

Moreover, we can account for the data in (7) and (8) without having to assume two different lexical entries for fa, lit. 'tree' or 'wood', that are mass. Our analysis predicts that when the numeral combines with a noun like fa directly, as in (7), then the resulting expression will be semantically well-formed only if the noun is understood as notionally count, since notionally mass nouns have no inherent atoms in their denotation. However, if fa occurs in a CL-construction as in (8), the numeral counts physically distinct parts denoted by the noun. These can be either individual trees ( $fa_{count}$ ) or pieces of wood ( $fa_{mass}$ ).

In sum, our analysis provides an alternative to mass or flexible approaches to the Hungarian nominal system by treating classifiers as operators on count nouns – underspecified with respect to their atoms – required to determine the domain of counting for the numeral. Hungarian provides evidence that the functional category of CL and a grammatical mass/count can co-occur, suggesting a much wider spectrum of countability patterns than it has often been suggested.

## References

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