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An empirical method to distinguish the meanings of three case suffixes in Hungarian[1]

Abstrakt (Empiryczna metoda odróżniania znaczeń trzech sufiksów przypadka w węgierskim). W artykule przedstawiono empiryczną metodologię badania struktury semantycznej trzech węgierskich sufiksów: *-nak/-nek* (celownik), *-hoz/-hez/-höz* (allatyw) i *-nál/-nél* (adesyw). Sufiksy przypadków mają szeroką polisemiczną strukturę semantyczną, która do tej pory była najczęściej badana z punktu widzenia lingwistów w literaturze węgierskiej. W przeciwieństwie do poprzednich badań, obecne zadanie sortowania (por. Sandra i Rice 1995) opiera się na teście wykonywanym przez użytkowników języka. Informatorami było 25 rodzimych użytkowników języka, których zadaniem było posortowanie 3 zestawów po 20 zdań, z których każde zawierało jeden wyraz z jednym z trzech sufiksów. Zostali poproszeni o utworzenie dowolnych grup na podstawie znaczenia sufiksów. Następnie wyniki zostały poddane hierarchicznej analizie skupień za pomocą programu Past, który zilustrował bardziej typowe pary i podobieństwa w dendrogramie. Wykresy na dendrogramach pokazują, które znaczenia są bliższe, a które mniej podobne. Metoda ta może być użytecznym narzędziem do poznania sieci polisemicznej opartej na intuicji użytkowników języka.

Abstract. This paper presents an empirical methodology for examining the semantic structure of three Hungarian suffixes: *-nak/-nek* (dative), *-hoz/-hez/-höz* (allative) and *-nál/-nél* (adessive). Case suffixes have a wide polysemic semantic structure that so far has been mostly examined from a linguistic point of view in the Hungarian literature. In contrast with the former investigations, the present sorting task (cf. Sandra and Rice 1995) is based on a test performed by language users. Informants were 25 native speakers whose task was to sort 3 packs of 20 sentences that contained one word with one of the three case suffixes each. They were asked to make arbitrary groups based on the meaning of the suffixes. Then the results were put to a hierarchical clustering analysis by the software Past, which illustrated the more typical pairings and similarities on a dendrogram. The graphs on the dendrograms show us which meanings are closer in sense, and which ones are less similar. The method may be a useful tool for learning something about a polysemic network based on the language users' intuition.

1. Introduction

The paper offers an empirical methodology for distinguishing between the meanings of three Hungarian case suffixes: *-nak/-nek* (dative case), *-hoz/-hez/-höz* (allative case) and *-nál/-nél* (adessive case). The first two have a directional meaning by pointing towards a place (lative), while the third suffix has a locative meaning, situating something as being somewhere constantly in time. All of them have a rich polysemic semantic structure.

The model behind the experiment was Sandra and Rice's study (1995), with some changes in methodology. The main focus of this paper is on finding out whether it is possible to map the semantic structure of polysemic case suffixes by relying on the intuitions of native speakers. The paper starts with the theoretical background (2.) and continues by describing the methodology (3.) including the preliminary examination (3.1) and the circumstances of the sorting task (3.2). The results are presented afterwards (4.) and the paper concludes with a summary (5.).

2. Theoretical background

The theoretical framework of this research is cognitive linguistics (see Langacker 1987, 2008), especially cognitive semantics (see Lakoff 1987). In this framework, it is fundamental that grammatical elements like suffixes have meanings (Tolcsvai Nagy 2017: 242), although they are more schematic than those of words (e.g. nouns, verbs, adjectives, adverbs, etc.), which have lexical meanings.

As Langacker (1987: 277) underlines, linguistic units are not separate from each other, as they occur in composite structures. The elements of a composite structure are the component structures and the way they create their grammatical construction involves constituency. Semantic substructures of components are linked by correspondences (Langacker 1987: 280). In our case, the components of the composite structure are the nominal root and the case suffix. These considerations are important as they suggest that we cannot examine the meaning of the case suffixes separately. They occur in larger, more elaborate structures, so the supporting matrix of the inflexional morpheme, namely the root and the phrase itself will always affect how one can mentally process the meaning of the morpheme in question.

The semantic structures of these grammatical elements have fewer substructures and there is less conceptual content in them than in the case of words, and they construe a relation between two schematic figures (Tolcsvai Nagy 2017: 243). They are also typically polysemous, although the nature of polysemy of lexical words and grammatical elements is different. Polysemy is the phenomenon of one linguistic element

having multiple meanings which are semantically connected to each other (Tolcsvai Nagy 2013: 232, Langacker 2008: 38). Cognitive linguistics studies polysemy in relation to categorization. Cognitive descriptions favour the prototype theory (cf. Rosch 1978), which posits that category members are not equally "good", with some members possessing more features of the category than others. The best category member – the one that has the most features – is the prototype, and the other members are situated around it in a radial structure.

The meanings of a polysemic semantic structure are settled around a prototypical meaning, the other meanings result from semantic extension. Extensions are motivated (Radden–Panther 2004, Lewandowska-Tomaszczyk 2007, Tolcsvai Nagy 2017: 270), and it is the prototype that provides the cognitive model for that process. The direction of extension is usually from the more concrete to the more abstract. The prototype is usually the most concrete, historically the first, in language acquisition it is learnt first and it is the one that speakers consider contextually neutral (Tolcsvai Nagy 2013: 240).

As for Hungarian case suffixes, their etymologically primary meanings usually construe spatial relations (Korompay 1991), with other meanings arising from those. This raises some issues. For example, what is considered to be a new meaning? Also, is it worth assuming a continuity between polysemy and semantic vagueness (Cuyckens–Zawada 2001: xvi)? In order to attempt to establish where the nodes of the polysemic semantic structures of the three morphemes are, I chose to have a sorting task performed by native speakers.

3. Methodology

For the test, I asked native speakers to accomplish a sorting task. There were 25 informants; each of them had begun their university studies in a linguistic discipline – either in teacher training or in disciplinary studies – but they had not yet obtained their master degree. The 25 informants received 20 sentences on cards, each containing a word with one of the three suffixes. Each card had exactly one word with the chosen suffix on it – and the suffix was set in bold. The sentences were simplified corpus data from the Hungarian Gigaword Corpus (MNSZ) (Oravecz–Váradi–Sass 2014), and to select them I had made a preliminary examination, as discussed in 3.1 below.

3.1. Corpus based examination

I made a corpus-based examination to map the semantic structure of the suffixes. First, I made a query in HGC for nominal lemmas in the relevant cases. From these concordance lists I created random samples, with 500 tokens for the suffix *-nak/-nek*, and 100–100 tokens for *-hoz/-hez/-höz* and *-nál/-nél.* My main goal was to map the semantic structure of the dative case suffix, *-nak/-nek*, and I used the other suffixes to test the adequacy of the method. After that, I analyzed the list considering what role the searched nouns have in their constructions, what their function is. This was impor-

tant because I wanted to measure the frequency of the functions. Repetitive data were removed before counting frequency.

I made sure that every function would be on a card that was present in the list, too. Some functions which are recognized by the literature (cf. Rácz–Szemere 1985, Keszler 2000) were not represented in the random sample. These were also included in the sorting task (see 3.2.).

Tables 1–3 contain the functions that occurred in the corpus supplemented by those that did not. Under each function I show one representative sentence from the cards. I set the examined morphemes in bold.

Table 1 lists the functions of the suffix *-nak/-nek* along with their frequency data in percentages[2] (I marked the functions that did not occur in the corpus with an asterisk [*]):

Function	Frequency in the random sample
connectedness (genitive) A fiú**nak** a könyve került hozzám. The boy$_{DAT}$ the book$_{3SG.Px}$ get$_{Past.3SG}$ me$_{ALL}$ 'The boy's book got to me.'	41%
the endpoint of a process, the recipient of something (beneficient/maleficient; dative) A hallgató levelet írt a professzor**nak**. The student letter$_{ACC}$ write$_{Past.3SG}$ the professor$_{DAT}$ 'The student wrote a letter to the professor.'	25%
the endpoint of mental processes, evaluations János festő**nek** kiváló. John painter$_{DAT}$ excellent. 'John is an excellent painter'	13%

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[2]   There is a debate in Hungarian linguistics about whether the genitive function is part of the polysemic semantic structure or this is rather a case of homonymy (cf. Ladányi 2008, 2017). That is because there are many structural differences between the possessive construction in which the genitive appears and other constructions with the suffix. In the possessive construction, the noun ending with *-nak/-nek* is the dependent of a noun, while in other occurrences, it is an argument of a verb. Also, this construction involves agreement in person and number between the possessor and the possessed thing, which does not occur in other cases.

the crossovers between dative and genitive (dative possessive and cases where the beneficient/ maleficient is also a possessor[1])	8,6%
1. Vége a hangoskodás**nak**. End$_{3SG.Px}$ the bluster$_{DAT}$ 'The bluster is over.' 2. A bizottság**nak** egy hónap áll a rendelkezésére. The committee$_{DAT}$ one month stand$_{Pres.3SG}$ the disposal$_{3SG.Px.SUB}$ 'The committee has one month in their disposal [to act].'	
agent / experient of the process	5,4%
Az alperes**nek** fizetnie kell. The defendant$_{DAT}$ pay$_{INF.3SG}$ must$_{Pres.3SG}$ 'The defendant must pay.'	
causals	3,8%
Mi mindig örülünk egymás**nak**. We always rejoyce$_{Pres.1PL}$ (each other)$_{DAT}$ 'We are always happy to see each other.'	
spatial endpoint	1,4%
A szörfös a parti kövek**nek** csapódott. The surfer the coastal stones$_{DAT}$ smash$_{Past.3SG}$ 'The surfer smashed into the coastal stones.'	
resultatives	0,8%
A nagymamám a málnát szörp**nek** teszi el. The grandmother$_{1SG.Px}$ the raspberry$_{ACC}$ syrup$_{DAT}$ preserve$_{Pres.3SG\ PREF}$· 'My grandmother preserves raspberry for (making) syrup.'	
* ethical dative	-
Csak le ne verjen **nek**em valamit! Just down$_{PREF}$ not knock$_{Pres.ind/subj.3SG}$ me$_{DAT}$ something$_{ACC}$ 'Just don't knock anything down for me!'	

[1]   The former is closer to the genitive: it is the argument of the possessive *van/nincs* (the Hungarian existential verb: 'be / not be', which can either be present or left out) 'have'; while the latter is closer to the dative: the noun in that case can be understood as a beneficient/maleficient of a process, and also as a possessor (cf. Elekfi 1993): as there is also agreement in person and number between the possessor (the noun ending with -*nak/-nek*) and the possessed thing.

Table 1: Functions of the dative case suffix

We can see from the results that what is considered to be the prototype in the semantic network is very rarely represented in the random sample. Yet, we can still assume that it supplies the best cognitive motivation for the extension of meaning. We

can also observe that the semantic structure of the suffix is arranged around two main nodes: the dative and the genitive functions.

Table 2 contains the functions that occurred in the random sample of *-hoz/-hez/-höz*:

Function	Frequency in the random sample
inherence Az agave a liliomok családjá**hoz** kapcsolódik. The agave the lilies family$_{3SG.Px.ALL}$ relate$_{Pres.1SG}$ 'The agave is related to the family of lilies.'	22%
final goal, abstract A háztartások alkalmazkodtak a valóság**hoz**. The households adapt$_{Past.3PL}$ the reality$_{ALL}$ 'The households have adapted to reality.'	22%
final destination, concrete Nórát az ügyfélszolgálat**hoz** irányítják. Nora$_{ACC}$ the (customer service)$_{ALL}$ direct$_{Pres.3PL}$ 'Nora is directed to customer service.'	18%
final destination, abstract A szervezet eddig csak egyszer fordult bíróság**hoz**. The organization yet only once turn$_{Past.3SG}$ court$_{ALL}$ 'The organization has turned to the court only once so far.'	17%
endpoint of mental processes or evaluation A régebbi LG mobil**hoz** képest meglehetősen furcsán néz ki az új. The older LG mobile$_{ALL}$ 'compared'(Postp) quite weird look out$_{PREF}$ the new. 'The new LG mobile looks quite weird compared to the old one.'	16%
final goal, concrete Az alapítvány**hoz** minimum tíz fő kellene. The foundation$_{ALL}$ minimum ten people need$_{Pres.cond.3SG}$ 'A minimum of ten people is needed for (having) a foundation.'	3%
dative Az új tévéműsor az idősebbek**hez** szól. The new tv-programme the older$_{PL.ALL}$ speak$_{Pres.3SG}$ 'The new TV-programme speaks to the elderly.'	1%

Table 2: The functions of the allative case suffix

Table 3 contains the functions that occurred in the random sample of *-nál/-nél* (in addition, an asterisk [*] marks the functions that did not occur in the sample, but do exist):

Functions	Frequency in the random sample
connectedness Zsuzsa egy televíziós cég**nél** dolgozik. Zsuzsa a television$_{(ADJ)}$ company$_{ADE}$ work$_{Pres.SG3}$ 'Zsuzsa works for a television company.'	22%
spatial relation, concrete Csak öt percig maradtam anyám**nál**. Only five minute$_{TERM}$ stay$_{Past.1SG}$ mother$_{1SG.Px.ADE}$ 'I only stayed at my mother's for five minutes.'	20%
comparison A számlám a várt**nál** lényegesen magasabb. The bill$_{1SG.Px}$ the expected$_{ADE}$ substantially higher. 'My bill is much higher than expected.'	19%
time / occasion Az ír teniszező 6:0, 5:1-**nél** feladta a meccset. The Irish (tennis player) 6:0, 5:1$_{ADE}$ give-up$_{Past.3SG}$ the match$_{ACC}$ 'The Irish tennis player gave up the match at 6:0, 5:1.'	19%
abstract spatial relation Néhány szervezet**nél** lassabban mennek a dolgok. Some organization$_{ADE}$ slowlier$_{ESS}$ go$_{Pres.3PL}$ the things 'Things go slower at some organizations.'	14%
location / external condition Marianna a konyhában ült gyertyafény**nél**. Marianna the kitchen$_{INE}$ sit$_{Past.3SG}$ candlelight$_{ADE}$ 'Marianna was sitting in the kitchen by candlelight.'	2%
aspect / regard A színészek**nél** Dr. House karaktere a legnépszerűbb. The actors$_{ADE}$ Dr. House character$_{3SG.Px}$ the popular$_{SUPERLATIVE}$ 'As for the actors, the most popular is Dr. House's character.'	2%
* condition A sérült férfi öt percig nem volt tudatá**nál** The injured man five minute$_{TERM}$ not be$_{Past.3SG}$ awareness$_{3SG.Px.ADE}$ 'The injured man was not aware for five minutes.'	-

3.2. The sorting task

The model behind my study was the experiment made by Sandra and Rice (1995). Their goal was to map the meaning structure of English prepositions *at, on* and *in*. They used 20–20 cards as stimuli for the experiment, and I worked with the same number of cards. However, they selected the set of cards randomly (Sandra–Rice 1995: 107), a practice from which I departed. First, I made sure that every function listed above in 3.1. should be represented by at least one card. Secondly, I wanted to avoid any category being over- or underrepresented. To this end, I created a sample in which every category had as many examples as many times they reach 5% in the random list (because 1 card accounts for 5% in the pack of 20 cards). From this second sample, I selected for the remaining places randomly, which is how I obtained my 20 cards.

The front side of each card showed a sentence containing the nominal with the examined suffix. I set the suffix in bold. On the reverse side of the cards I wrote the number of the card, from 1 to 20: this helped me with registering the results. The informants did not see these.

Every informant received all sets of cards. The order in which the informants got the sets was random and so was the order of the sentences in each set. This is how I wanted to avoid the order affecting the results on the one hand, and that the level of concentration would cause differences in the adequacy of the results on the other hand. The informants had as much time as they wanted, and they could see the instruction for the entire length of the task. The instruction was the following:

(4)   Sort the following cards in an arbitrary number of groups according to the meaning of the suffix [X][3] in the sentences.

From the text of the instruction I wanted to exclude any grammatical terms. Informants were free to create as many groups as they wanted. This means that they could have separated all cards one by one, or they could also have made one group with all the cards in it. After the informants finished sorting the cards, I noted the groups and then I annotated them by the help of the Past software, which can make a hierarchical clustering analysis from tables, with the result presented on a dendrogram. The dendrogram shows which representations of suffixes are closer to each other in meaning and which are farther apart according to the 25 native speakers. The dendrogram of the suffix *-nak/-nek* can be seen in Figure 1.

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[3]   [X] stands for the relevant suffix, as the text of the instruction was the same with each suffix.
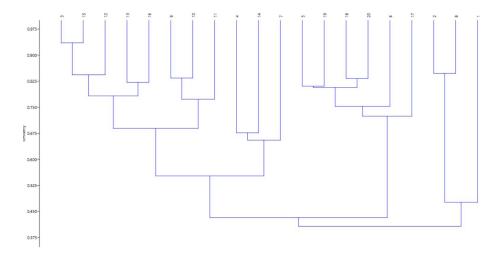
Figure 1: The dendrogram of the dative case suffix.

On the X-axis we can see the numbers of the cards. The Y-axis indicates "similarity" – it shows the degree of similarity. For the results, we shall study the branches of the dendrogram. The more speakers sorted certain cards in the same group, the closer they are in the graph and the higher the branches split. There can be two extreme scenarios. If all the speakers had made one group out of the 20 cards, there would have been one horizontal line at the top of the figure. On the other hand, if the speakers had made 20 separate groups out of the cards, there would have been separate vertical lines.

4. Results

After the sorting I got the following statistics as shown in table 4:

	-nak/-nek (dative)	*-hoz/-hez/-höz* (allative)	*-nál/-nél* (adessive)
minimum–maximum number of groups	2–11	2–11	3–10
average number of groups / informant	6,4	5,4	5,7
most common number of groups	6	4	5
minimum number of cards / group	1	1	1
maximum number of cards / group	17	17	12

Table 4: The statistics of the sorting

There are many informative aspects that are worth studying after having the results. First, we can observe the splitting points of the dendrograms. The lower they are, the more separate groups they isolate. One crucial aspect is the lowest splitting point, because the higher it can be found, the more difficult it presumably was to distinguish the meanings of the suffixes. On Figures 2–4 we can see all three dendrograms.
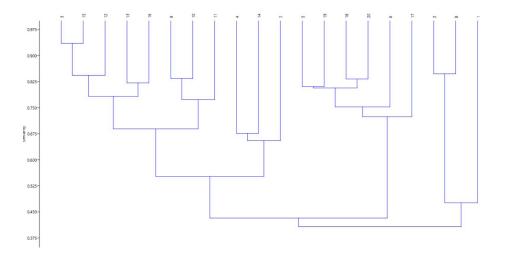

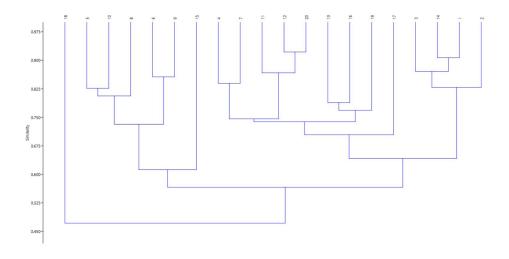Figure 2: The dendrogram of the dative case suffix.

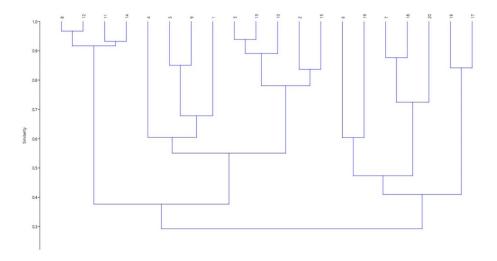Figure 3: The dendrogram of the allative case suffix.

Figure 4: The dendrogram of the adessive case suffix.

We can observe that there is a little difference in the lowest splitting point among the three suffixes. The adessive (-*nál/-nél*) has the lowest first splitting point at around 0.3. This can mean that the task to sort the meanings was the easiest in the case of this suffix. If the main branches split at the bottom of the graph, that can also mean that there are distinct groups. The fact that there are small groups that split near to the 1.0 value also supports this.

On the other hand, in the case of the allative (-*hoz/-hez/-höz*) the first splitting point coming from down to top is the highest: it is higher than 0.45, which means that the hardest task was to distinguish the meanings of those suffixes. What is more, the highest splitting point is just above 0.9, which is the lowest value among the three morphemes. This can mean that according to the speakers, this morpheme's meanings were the least similar to each other.

What strengthens this assumption are the tables of data themselves. From these tables we can see how many "pairings" did not occur, i.e. that is the number of two cards never placed into one group. The results are similar: for the adessive, there were as many as 27 pairings that never occurred. On the other hand, for the allative, this number is only 3. This might suggest that speakers could differentiate more easily the cards with -*nál/-nél* suffixed nouns than the ones with -*hoz/-hez/-höz* on them. The highest number in the dataset is also worth observing. It tells us how many people considered the closest meanings to belong to the same group (as determined by the position where the highest branch splits). For the adessive, this number is 24; for the allative, only 20 (the lowest among the three suffixes).

From the dataset we can also see which cards were paired with the lowest number of other cards. In other words: which realizations are similar to the fewest other reali-

zations. This can mean that we can posit a separate meaning there. In the case of the adessive, the following three cards belong to this group:

(2) #7 Az ír teniszező 6:0, 5:1-**nél** feladta a meccset.
     The Irish (tennis player) 6:0, 5:1$_{ADE}$ give-up$_{Past.3SG}$ the match$_{ACC}$
     'The Irish tennis player gave up the match at 6:0, 5:1.'

(3) #17 Az énekes az élő adások felé**nél** kiesett a versenyből.
     The singer the live shows half$_{3SG.Px.ADE}$ fall$_{Past.3SG}$ the competition$_{ELA}$
     'The singer fell out of the competition at the half point of the live shows.'

(4) #18 Az alkalmazás minden egyes belépés**nél** levont 13 forintot.
     The application every single login$_{ADE}$ deduct$_{Past.3SG}$ 13 forints$_{ACC}$
     'The application deducted 13 forints at every single login.'

These three belong to my "time / occasion" category. Speakers had the impression that these three were closer to each other than to any other meanings, and we can see that on the dendrogram (Picture 4) they constitute one separate group.

As for the dative (-*nak/-nek*), the one with the lowest number of pairings was the ethical dative:

(5) #7 Csak le ne verjen **nek**em valamit!
     Just down$_{PREF}$ not knock$_{Pres.ind/subj.3SG}$ me$_{DAT}$ something$_{ACC}$
     'Just don't knock anything down for me!'

It is a unique example in several respects. First of all, it was the only example where the "suffix" did not occur at the end of the word. This is because the ethical dative typically occurs in the form of a personal pronoun (cf. Janda 1993 for the Czech language). In the case of Hungarian, *nekem* is the first person singular personal pronoun in the dative case. Secondly, its meaning is more interactional than in any other occurrences. That is why Fried (2014) prefers to call it 'interactional dative' rather than 'ethical dative'.

But this example was still placed into a group of three cards with the following two:

(6) #4 Mi mindig örülünk egymás**nak**.
     We always rejoyce$_{Pres.1PL}$ (each other)$_{DAT}$
     'We are always happy for each other.'

(7) #14 Az ügy nagyon fontos ön**nek**.
     The case very important you$_{DAT}$
     'The case is very important to you.'

We can observe that the ethical dative got into a group where it is an important factor that the primary figure, the trajector is involved in a process. So the speakers formed a category on the basis that there was a person or persons concerned by a situation.

These are the main pieces of information we can extract from the dataset or the dendrogram at the first sight. Now let us take a closer look at the dendrograms and see what they tell us about the semantic structures of the suffixes.

4.1. The dative suffix

My main intention was to examine the polysemy of the dative suffix in order to ascertain whether I could learn something about the place of the genitive function in it. In the preliminary corpus-based examination, there were two main nodes in the semantic structure: the dative and the genitive. The dendrogram shows us three main branches: one for the dative, one for the genitive, and one for the 'exceptional' ones (e.g. spatial, resultative and the endpoint of mental process/evalution).

The two closest representations of the suffix are the prototypical dative functions: a transactional process that can take place in physical space, where a physical object can be moved from one point to another.

(8)   #3 A diákok**nak** kiosztották a félévi bizonyítványt.
      The students$_{DAT}$ distribute$_{Past.3PL}$ the mid-year certificate$_{ACC}$
      'The mid-year certificates were distributed to the students.'

(9)   #15 A hallgató levelet írt a professzor**nak**.
      The student letter$_{ACC}$ write$_{Past.3SG}$ the professor$_{DAT}$
      'The student wrote a letter to the professor.'

Benefactive and malefactive functions were the closest to the dative. These three appeared in the following sentences (10–12):

(10) #12 Pénzbirság a Ferrari**nak**.
      Fine$_{(Noun)}$ the Ferrari$_{DAT}$
      'Fine (fee) for the Ferrari.'

(11) #13 A világbajnokságon az olaszok**nak** drukkoltam.
      The (world championships)$_{SUP}$ the Italians$_{DAT}$ cheer$_{Past.1SG}$
      'I was cheering for Italy in the world championships.'

(12) #16 Zsófi egy életmódmagazin**nak** dolgozik.
      Zsófi a (lifestyle magazine)$_{DAT}$ work$_{Pres.3SG}$
      'Zsófi works for a lifestyle magazine.'

(10)–(12) form a tighter group within the main branch, but there is also a sub-branch in this category. This is the group of sentences with deontic modality. Deontic modality expresses obligation (cf. Talmy 2000). In the constructions that have deontic modality there is a coercive force or expectation and a figure whom the force influences. A typical deontic construction (Kugler 2017: 481–482) in Hungarian contains the verb *kell* ('must') which expresses the necessity as a process, and an infinitive, which is the

process represented as necessary. The figure that is forced (the agent / experiencer) is marked with the dative suffix *-nak/-nek*. This is shown by sentences (13–15) below.

(13) #9 Idegenek**nek** belépni tilos.
Strangers$_{DAT}$ enter$_{INF}$ prohibited
'Entering is prohibited to strangers.'

(14) #10 Az alperes**nek** fizetnie kell.
The defendant$_{DAT}$ pay$_{INF.3SG}$ must$_{Pres.3SG}$
'The defendant must pay.'

(15) #11 A bizottság**nak** egy hónap áll rendelkezésére.
The committee$_{DAT}$ one month stand$_{Pres.3SG}$ disposal$_{3SG.Px.SUB}$
'The committee has one month at their disposal [to act].'

These sentences can be in the 'dative' node of the dendrogram because they express processes whose figures are coded by the dative case.

The other larger node is centered around the genitive function. A prototypical genitive is when there is a possessor with an alienable possessed thing. This is the case with sentence #5 (16):

(16) #5 A fiú**nak** a könyve került hozzám.
The boy$_{DAT}$ the book$_{1SG}$ get$_{Past.3SG}$ me$_{ALL}$
'The boy's book got to me.'

Other members in this group express other types of connectedness:

(17 #19. A vállalkozók**nak** egy széles rétege pályázhat.
The entrepreneurs$_{DAT}$ a wide layer$_{3SG.Px}$ (run for)$_{Pres.3SG}$
'A large number of entrepreneurs can compete.'

(18) #18 A testület ura a helyzet**nek**.
The corporation ruler$_{3SG.Px}$ the situation$_{DAT}$
'The corporation has full control over the situation.'

(19) #20 Az eszmecseré**nek** az időpontját október 15-re javasoljuk.
The conference$_{DAT}$ the date$_{3SG.Px.ACC}$ October 15$_{SUB}$ recommend$_{Pres.1PL}$
'We recommend the date of the conference to be 15th October.'

(20) #17 Vállára borulhatsz az édesanyád**nak**.
Shoulder$_{3SG.Px.SUB}$ lean$_{Pres.2SG}$ the mother$_{2SG.Px.DAT}$
'You can lean on your mother's shoulders.'

We can observe that the construction has various functions beyond typical possession. Various substructures of the semantic structure of the head noun may be foregrounded as an active zone, including a) a part of the whole (17), b) having power over something (18), c) the time of an event (19) or d) a body part of a person (20).

In these sentences, the nouns ending with *-nak/-nek* are the arguments of nouns that agree with them in person. This is one significant structural difference compared to the dative suffixes occurring in other functions, where those nouns are the arguments of a verb.

That is one of the main reasons why linguists argue that one should assume homonymy here rather than polysemy (cf. Ladányi 2008, Korompay 1991: 302). Ladányi (2008: 533) suggests that in a functional rather than merely morphological system of cases, we should consider genitive *-nak/-nek* as a separate case.

Yet, there is no question that historically they belong together and that there are transitional functions between them. I suppose that the genitive function also belongs to the polysemic semantic structure of the suffix. On the one hand, this is because we can process its meaning on the analogy of other functions. On the other hand, the assumption would receive additional support if the informants sorted the dative possessive (21) and the "possessor in the dative case" (22) (as crossovers between the dative and the genitive functions) in the analogically "appropriate" groups. In other words, with the former situated closer to the genitive, the latter closer to the dative node.

(21) #6 Vége a hangoskodás**nak**.
      End$_{3SG.Px}$ the bluster$_{DAT}$
      'The bluster is over.'

(22) #11 A bizottság**nak** egy hónap áll rendelkezésére.
      The committee$_{DAT}$ one month stand$_{Pres.3SG}$ disposal$_{3SG.Px.SUB}$
      'The committee has one month at their disposal [to act].'

My informants sorted #6 (21) in the node of the genitive function, and #11 (22) in the node of the dative function. This suggests that the speakers felt analogies in the meaning of the members of these groups. The result also supports the claim that there is a continuum in the semantic structure of the dative case suffix from the prototype: from the spatial relation through the dative function to the genitive function.

4.2. The allative suffix

The prototype of the allative suffix also expresses a spatial relation. In the case of this morpheme, there are some relevant observations we can make that also tell us something about the method itself and about the way the informants may have processed the task. With this morpheme we can observe how much the structure influences the result of the experiment.

There was only one construction where there was a postpositional composite structure having a suffixed noun as a component structure. It was sentence #18 (23), which contained the construction *vmihez képest* 'compared to sg'. On the dendrogram this example was separated from all the other sentences, see Figure 3.

(23) #18 A régebbi LG mobil**hoz** képest meglehetősen furcsán néz ki az új.
      The older LG mobile$_{ALL}$ compared$_{(Postp)}$ quite weird look$_{Pres.3SG}$ out$_{PREF}$ the new.
      'The new LG mobile looks quite weird compared to the new one.'

However, it also happened that two constructions both contained a word derived from the verb *köt* 'connect sg to sg' as the head of the construction, and still they were assigned to different groups. In this case, semantic similarity seems to have overridden the structural point of view.

(24) #15 Pályázni csak határidő**höz** kötötten lehet.
      Apply$_{INF}$ only deadline$_{ALL}$ connected$_{ESS}$ possible.
      'Applying for something is only possible (when) connected to a deadline.'

Sentence #15 (24) is far in the graph from #11 (25), which belongs to the following group:

(25) #11 A szervezetek pártok**hoz** egyáltalán nem kötődnek.
      The organizations parties$_{ALL}$ (at all) not connect$_{Pres.3PL}$
      'The organizations are not connected to parties at all.'

(26) #12 Az agave a liliomok családjá**hoz** kapcsolódik.
      The agave the lilies family$_{3SG.Px.ALL}$ relate$_{Pres.1SG}$
      'The agave is related to the family of lilies.'

(27) #20 Az úri társaság**hoz** tartozás nem volt kedvemre való.
      The gentlemanly company$_{ALL}$ belonging not be$_{Past.3SG}$ humour$_{1SG.Px.SUB}$ be ('suitable').
      'Belonging to the gentlemanly company was not much to my liking.'

As we can see, expressing 'connectedness' was more important in the case of sorting sentence #11 (25). Although it is structurally more akin to #15 (24), semantic closeness might have been more relevant in the decision of the informants.

4.3. The adessive suffix

As has been mentioned before, the most distinct groupings involved this suffix. It was here that the most speakers sorted two sentences into one group (24 informants out of 25). These were sentences #8 (28) and #12 (29), and #11 (30) and #14 (31) were also close to them. The shared aspect of the four is that the adessive suffix is attached to nouns that refer to human beings.

(28) #8 A színészek**nél** Dr. House karaktere a legnépszerűbb.
      The actors$_{ADE}$ Dr. House character$_{3SG.Px}$ the popular$_{SUPERLATIVE}$
      'As for the actors, the most popular is Dr. House's character.'

(29) #12 Gyermekek**nél** intő jel lehet a súlyvesztés.
Children$_{ADE}$ warning sign be('can be') the (loss of weight).
'Among children, loss of weight can be a warning sign.'

(30) #11 Eltökéltségből nem volt hiány a kenusok**nál**.
Determination$_{ELA}$ not be$_{Past.3SG}$ lack the canoeists$_{ADE}$
'There was no lack of determination among the canoeists.'

(31) #14 Sokak**nál** jelentkeztek a csontritkulás tünetei.
Many$_{PL.ADE}$ appear$_{Past.3PL}$ the osteoporosis symptom$_{3PL.Px}$
'Symptoms of osteoporosis have appeared in many people.'

As shown in Table 3, the third most common function of the morpheme in the random sample was expressing comparison. Among the 20 cards, there were three with this function, and two of them (#16 and #17, see (32) and (33)) were sorted into one group, the third one (#4, see (34)) being assigned to the spatial category.

(32) #16 A számlám a várt**nál** lényegesen magasabb.
The bill$_{1SG.Px}$ the expected$_{ADE}$ substantially higher.
'My invoice is much higher than expected.'

(33) #17 A felelősök különb**nél** külön kritériumrendszereket állítanak fel.
The responsibles better$_{ADE}$ better (systems of criteria)$_{ACC}$ set$_{Pres.3PL}$ up$_{PREF}$
'The responsible people set up systems of criteria that are better than better.'

(34) #4 Az autóbusz nem jutott Budapest**nél** messzebre.
The bus not get$_{Past.3SG}$ Budapest$_{ADE}$ farther$_{SUB}$
'The bus didn't get farther than Budapest.

Sentence #4 (34) ended up on the same branch as the following examples:

(35) #5 Marianna a konyhában ült gyertyafény**nél**.
Marianna the kitchen$_{INE}$ sit$_{Past.3SG}$ candlelight$_{ADE}$
'Marianna was sitting in the kitchen by candlelight.'

(36) #9 A mikrofon**nál** Bőthy Attila.
The microphone$_{ADE}$ Bőthy Attila.
'Attila Bőthy is at the microphone.'

(37) #1 Csak öt percig maradtam anyám**nál**.
Only five minute$_{TERM}$ stay$_{Past.1SG}$ mother$_{1SG.Px.ADE}$
'I only stayed at my mother's for five minutes.'

The reason why sentence #4 (34) was assigned to this group may be that the root of the word in adessive case expresses a concrete place. This might have been more essential for the speakers than the comparative structure. A typical comparative construction consists of a comparative adjective (marked with the suffix -*bb*) and a noun

in the adessive case. Even though *Budapest**nél** messzebbre* 'farther than Budapest' is this type of construction, the fact that the adessive suffix appears with a toponym, and that this is a scene in which spatial relations are so essential, resulted in its appearance on a different branch of the dendrogram.

The results so far show that we cannot be sure about the reasons behind the informants' choices. Not asking them about their decisions was intentional, because I did not want them to overthink their choices or be too (self)reflexive with their decisions and I was curious about their instincts. And from the dendrograms we can see that occasionally the similarity of structure, at other times the similarity of meaning "wins".

5. Summary

The paper was about an empirical method for examining the polysemy of case suffixes in Hungarian through native speakers' intuitions, and not only from a linguistic point of view. For the empirical experiment, I used three Hungarian case suffixes: *-nak/-nek* (dative suffix), *-hoz/-hez/-höz* (allative suffix), and *-nál/-nél* (adessive suffix). The methodology has never been used before in a study related to Hungarian case suffix polysemy, and therefore I made some changes on the original version of the sorting test. Differently from the model experiment described by Sandra and Rice (1995), I performed a corpus-based study before the sorting task to find out about the frequency of particular functions expressed by these morphemes. I intended to make sure that the sample the informants had to sort would be representative as for their frequency. This is important if we want to be able to discover the semantic relations and the analogue ways of mental processing concerning certain instantiations of the suffixes. This way we gain more reliable results.

The information on the graph supplies valuable details about the semantic structure of the suffixes. One should read the graph by examining the splitting point of the branches from the bottom to the top. The lower the splitting point is, the lesser the togetherness of the members.

The dendrogram of the dative suffix produces a similar arrangement as the corpus data. The two main nodes of the semantic structure are the dative and the genitive functions; spatial, resultative functions and the endpoint of mental processes/evaluations were separated by the informants. Also, the crossovers between the dative and genitive functions were manifested in accordance with expectations. This might mean that the informants perceive a continuum between the two functions, there is a semantic relation between them, so that processing these constructions shows analogies, and therefore the assumption of polysemy is well-motivated.

As for the allative case, we observed a stronger similarity in the realizations expressing connectedness. We could see that a specific pattern of construction (e.g. a postpositional construction with a suffixed noun) can result in one example constituting a separate branch. But on another occasion, in the case of the adessive suffix we saw that even the representatives of a typical morphological pattern – a comparative construction – can be sorted into different groups.

The methodology based on the sorting tasks and the hierarchical clustering analyses of their results by the Past software proved to be useful for examining polysemy though the intuition of native speakers. That is important because this way polysemy studies are supplemented by a different point of view than the intuitions of linguists. The method could bring us closer to the conceptual structure that is in the head of the speakers.

Abbreviations

1 = first person, 2 = second person, 3 = third person,
ACC = accusative, ADE = adessive, ADJ = adjective, ALL = allative,
Cond = conditional, DAT = dative, ELA = elative, ESS = essive,
ind = indicative, INE = inessive, INF = infinitive, Past = past tense,
PL = plural, Postp = postposition, PREF = verbal prefix, Pres = present tense,
Px = possessive meaning, SG = singular, SUB = sublative, subj = subjunctive,
SUP = superessive, TERM = terminative

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