

Compositional Analysis of Turkish Agent Nominalizers

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Abstract. I propose analyses for the Turkish agent nominalizers *-(y)IcI* and *-CI*. I modify the denotation for the Sakha agent nominalizer *-AAccI* (Baker & Vinokurova 2009) because the denotation for *-AAccI* formally allows for readings that are unattainable by *-(y)IcI* in Turkish. I change the domain of the suffix's denotation and the unattainable reading is rendered out. The analysis for *-CI* makes use of indices from the context and arrives at a relation to be established between the base and the derived nouns. I use context dependent readings to argue for using context dependent indices. Both analyses have the compositional properties of pseudo-incorporation to account for the non-referential readings of the internal argument in *-(y)IcI* and the noun base for *-CI*.

Keywords. Turkish; agent nominalizers; derivation; formal semantics

1. Introduction. In Turkish, there are two agent nominalizers: *-(y)IcI* and *-CI*. The first of which is similar to the agent nominalizer *-er* in English. Turkish has other suffixes (*-AcAK*, *-gAç*) for instrumental readings that take verb bases (*aç-acak* open-*AcAK* '(bottle) opener', *del-geç* punch-*gAç* '(hole) puncher'), I am interested in the agentive readings. I give simple examples for *-(y)IcI* in (1)¹. The suffix (Y)ICI takes a verb and derives the proto-agent (Dowty 1991) noun of that verb. The derivation is compatible with transitive and unergative verbs.

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|-----|---------------|---------------|-----------------|
| (1) | a. Transitive | b. Unergative | c. Unaccusative |
| | sat-ıcI | koş-ucu | *var-ıcI |
| | sell-er | run-ner | *arrive-r |

The derivational suffix *CI* is a productive suffix that takes nouns and derives agentive nouns. In Göksel & Kerslake (2004), the meaning outputs of this derivation are categorized as: profession (2a), ideological adherence (2b), person engaged in an activity (2c), and person liking something or habitual involvement (2d).

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|-----|-----------------|-----------|-------------|-------------|
| (2) | a. bök-çi | b. sol-cu | c. yol-cu | d. yalan-cı |
| | pastry-CI | left-CI | road-CI | lie-CI |
| | 'pastry seller' | 'leftist' | 'traveller' | 'liar' |

Both derivations can be represented as in (3). The derivation for (Y)ICI follows from taking a verb base and deriving an agentive noun. The derivation for *CI* needs a complex semantic relation SEM_i to be established between the base noun and the derived noun.

- (3) a. $[[X]_V - (y)IcI]_Y$ is a derivation where Y is a Noun that Vs
 b. $[[X]_N - CI]_Y$ is a derivation where Y is a Noun with SEM_i to a Noun X.

The Sakha *-AAccI* is similar to the Turkish (Y)ICI. They both take verbs as bases, but do not always mean the same (4).

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¹(Y)I = derivational nominalizer, (Y)ICI = agent nominalizer (verbs), 1 = first person, 3 = third person, ACC = accusative, CI = agent nominalizer (nouns), COP = copula, NMLZ = nominalizer, NOM = nominative, PROG = progressive, PST = past, SG = singular.

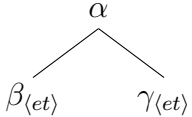
- (4) a. Sakha (Baker & Vinokurova 2009)
 ynaq-y ölor-ööccü
 cow-ACC kill-AAccI
 ‘a killer of cows, a butcher’
- b. Turkish
 inek öldür-ücü
 cow kill-(Y)ICI
 ‘cow killer, a sort of a disease/ poison.’

Baker & Vinokurova propose the semantic denotation in (5) for the suffix *-AAccI*. This denotation is also what Baker & Vinokurova propose for the English *-er*. ‘ \frown ’ is an operator proposed by Chierchia (1985). It takes predicative expressions and returns singular ones. Baker & Vinokurova use the ‘ \frown ’ operator because they regard all nouns as of type D_e . That is why the denotation is not of type $D_{\langle vt, et \rangle}$ but $D_{\langle vt, e \rangle}$.

$$(5) \llbracket -AAccI \rrbracket = \lambda P_{\langle vt \rangle} . \frown \lambda x . Gen e P(e) \wedge AG(e, x)$$

So far, I have introduced agent nominalizers in Turkish and Sakha. I now continue with introducing the semantic machineries utilized in the paper. These are: Restrict (Chung & Ladusaw 2003), a neo-davidsonian way of using events as arguments in semantics (Kratzer 2002, Maienborn 2011, Parsons 1990), and the composition of pseudo-incorporation (Dayal 2003).

Chung & Ladusaw provide Restrict as a semantic operation to explain incorporation. It is a mode of operation like Function Application (FA) or Predicate Modification (PM). There could be situations where one can choose to use either FA or PM for semantic composition. For example in (6), one can either go the route of type shifting and apply FA, or do not perform type shifting and have PM.

- (6) a. 
- b. FA
 $\beta_{\langle et \rangle} \rightarrow \beta_{\langle et, et \rangle}$
 $\llbracket \alpha \rrbracket = \llbracket \beta \rrbracket (\llbracket \gamma \rrbracket)$
- c. PM
 $\llbracket \alpha \rrbracket = \llbracket \beta \rrbracket \wedge \llbracket \gamma \rrbracket$

PM is not an operation of saturation while FA is. Restrict is similar to PM, in that, it is not an operation of saturation. PM requires both parts to be of same semantic type whereas Restrict only requires one part γ to be the set of arguments for the domain of the other part β . Chung & Ladusaw use this operation to explain the cases of incorporation in languages where an argument is used with a verb and does not saturate it. This can not be explained either by FA or PM alone, since the noun in question is not of the same semantic type (no PM) and the verb is not saturated (no FA).

Restrict provides a solution in similar spirits to PM – it does not saturate the verb but can still capture the compositional reading. In (7), I provide an abstract formalisation of the operation and an example. This formalisation can capture both operations of PM and Restrict.

- (7) a. Formalisation
 For any α that has daughters β and γ
 If $x \in dom(\llbracket \gamma \rrbracket)$ and $\llbracket \beta \rrbracket$ is a set of x
 Then $\llbracket \alpha \rrbracket = \llbracket \beta \rrbracket \wedge \llbracket \gamma \rrbracket$
- b. Example
 $\llbracket \alpha \rrbracket$ has daughters $\llbracket \beta \rrbracket \in D_{\langle et \rangle}$ and
 $\llbracket \gamma \rrbracket \in D_{\langle e, et \rangle}$
 $D_e \in dom(\llbracket \gamma \rrbracket)$ and $\llbracket \beta \rrbracket$ is a set of D_e
 Then $\llbracket \alpha \rrbracket = \llbracket \beta \rrbracket \wedge \llbracket \gamma \rrbracket$

A framework I use for my analysis is Neo-Davidsonian approach (Kratzer 2002, Maienborn 2011, Parsons 1990). In such an approach, it is possible to use events as arguments. This way, verbs can have an event argument in their denotation. An example for a verb denotation from Kratzer (2002) is given in (8).

only differ in the mode of composition (referential = FA, non-referential = Restrict) and in the interpretation of the direct object (overt ACC = referential, non-overt ACC = non-referential). Baker & Vinokurova show that ACC in Sakha is of different property than an ACC in English or Turkish for that matter, since it can be observed even in passive constructions.

In this section, I introduced the derivational suffixes, an analysis for the Sakha agent nominalizer *-AccI* (Baker & Vinokurova 2009), and the semantic machineries used in the paper (Chung & Ladusaw 2003, Dayal 2003, Kratzer 2002). In §2, I provide the relevant data and an approach to interpreting English possessives. In §3, I make changes to the Baker & Vinokurova's analysis and present a novel one for CI. In §4, I address the drawbacks of the analysis and how I handle them. In §5, I make conclusions.

2. Data. The agent nominalizer (Y)ICI does not change derivational meaning in any context, but CI allows for meaning shifts depending on the context. In (12), Speaker A (i) talks about what s/he likes to read and Speaker B (ii) uses the word *kitapçı* that means 'book-seller' out of context. In this case, Speaker B uses *kitapçı* to mean that 's/he likes to read books instead of magazines'. The same meaning shift is not achievable by (Y)ICI (13).

(12) CI

i. Speaker A:

Ben_i dergi oku-may-ı sev-iyor-um.
1.SG[NOM] magazine read-NMLZ-ACC like-PROG-1.SG
'I like to read magazines.'

ii. Speaker B:

Ben_j kitap-çı-yım
1.SG[NOM] book-CI-COP.1.SG
Literal: 'I am book-CI.'
Meaning: 'I like to read books.'

(13) (Y)ICI

i. Speaker A:

Ben_i kitap yaz-may-ı sev-iyor-um.
1SG[NOM] book write-NMLZ-ACC like-PROG-1SG
'I like to write books.'

ii. Speaker B:

Ben_j oku-yucu-yum.
1SG read-(Y)ICI-COP.1SG
'*I like to read books.'
'I am a reader.'

The meaning shift in (12) shows that the SEM_i in CI derivation is not constant for the same base noun *kitap* 'book'. SEM_i is also not constant across different base nouns. (14) shows an example of SEM_i changing depending on the base noun. Both derivations denote a profession but the relation to the base noun is different in each one of them.

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|---|--|
| (14) a. <i>börek-çi</i>
pastry-CI
'A pastry-seller'
'A pastry-seller is someone who sells pastries' | b. <i>deniz-ci</i>
sea-CI
'A sailor'
'A sailor is someone who sails the sea' |
|---|--|

The different relations held for the same type of derivation category can differ, it is not 'to sell' by default. The derivation does not fail to derive a noun because the relation 'to sell' is against the world knowledge, it uses a suitable relation fitting the context. In the case of (14b), selling a sea is against the world knowledge, but the derivation still proceeds by selecting another semantic relation 'to sail'. It is not to suggest that there are no worlds in which a sea can be sold. If the context is established well enough, for example a video game where seas, mountains, and other geographical places can be a merchandise to trade then the word *denizci* can mean a person who is in the business of trading seas. This further supports the context dependency of CI derivations.

Barker (2019) provides some classifications for English possessives in terms of some semantic properties of the composition. In a possessive construction, a relation between the possessed and the possessee is established. This relation is often considered as 'to possess' or 'to own'. Barker's classifications boil down to two categories: possessives where the relation is internal, possessives where the relation is contextually established. In (15a), the relation is internal and can readily be made. In (15b), the relation to be established needs a context.

- | | |
|---|---|
| (15) a. Internal relation
John's brother | b. Contextual relation
John's planet |
|---|---|

There are different ways the composition of possessives are achieved in semantics (Barker 2000, Partee & Borschev 1998, Vikner & Jensen 2002). What all of them have in common is that the relation between the parts of some possessive constructions is dependent on the context. This is similar to how the CI derivations change meaning depending on the context or have different relations for different nouns.

As a suffix operating on nouns, CI can take modified bases for derivation. This is not always the preferred reading. In (16), I give two contrasting examples of a modified base versus a modified derivation.

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|--|---|
| (16) a. <i>antika vazo-cu</i>
antique vase-CI
'*A vase seller who is antique'
'A seller of antique vases' | b. <i>eski vazo-cu</i>
old vase-CI
Reading 1: 'A vase seller who is old'
Reading 2: 'A seller of old vases'
Reading 1 > Reading 2 |
|--|---|

In (16a), the adjective *antika* 'antique' modifies the base noun *vazo* 'vase' because the modifier *antika* 'antique' is not compatible with an entity denoting a 'seller'. In (16b), a modifier *eski* 'old' can modify both a 'vase' and a 'seller'. The preferred reading is the modification of the derived word *vazocu* 'vase seller' instead of the base *vazo* 'vase'. This shows that the suffix CI is able to take a modified base and the preferred reading is modification after derivation. This can be due to the order of processing the language expression. If one takes the view that processing of expressions proceeds incrementally on a word basis, both the compatibility with

- b. $\llbracket kitap oku \rrbracket = book(x) \wedge read(e)(x)$
 $\llbracket kitap okuyucu \rrbracket = \llbracket (Y)ICI \rrbracket(\llbracket kitap oku \rrbracket)$
 $\llbracket kitap okuyucu \rrbracket = \lambda x. \exists y Gen e read(e)(y) \wedge book(y) \wedge AG(e, x)$

This analysis does not rely on the explanation of what ACC is in Sakha but depends on the exact domain provided for Sakha agent nominalizer and why it is not compatible with the Turkish agent nominalizer (Y)ICI. When there is no internal argument to Restrict the verb, the E-Closure on the internal argument still stands and saturates it. The ‘ \wedge ’ operator is not used since I regard referential nouns as of type D_e and non-relational nouns as of type $D_{(et)}$.

3.2 ANALYSIS OF CI. Derivations formed by CI are susceptible to meaning shifts depending on context (12) and the relation SEM_i is not constant across base nouns (14). Additionally, CI is able to take modified bases for derivation (16). All these make a compositional analysis viable. The base noun in CI derivations is treated similar to the pseudo-incorporation of an internal argument—they are non-referential. In the case of *kitapçı* ‘book seller’ for example, it is not a specific or definite type of a book that the proto-agent sells. I use this reading of non-referentiality and the context dependent properties of CI to come up with the denotation in (20). In this denotation, the operations of Restrict and E-Closure are baked in to have the non referential reading of the base noun and a context dependent covert relation is supplied with $g_c(i)$. The *Gen* is used as in Baker & Vinokurova to supply the event argument, with the reading of a generic event instead of an episodic one.

$$(20) \quad \llbracket CI \rrbracket = \lambda f_{(et)}. \lambda x. \exists y Gen e f(y) \wedge g_c(i)(e)(y) \wedge AG(e, x)$$

I make use of the same procedures of pseudo-incorporation as I did for (18), only this time there is a pseudo-incorporated argument from the beginning (base noun) and the relation is provided from the context as to what $g_c(i)$ stands for. This way, the semantic relation SEM_i for the derivation of CI is carried out by the context. The base noun is pseudo-incorporated and the same agentive reading is achieved for the derivation. The context provided relation is similar to the English possessives where the interpretation relies on the context. This time, it is utilized in a derivational process. In (21), I give an example for the composition of *vazo-cu* ‘vase seller’. The lexical entries are: $g_c(i) = sell(e)(x)$, $\llbracket vazo \rrbracket = vase(x)$.

$$(21) \quad \llbracket vazocu \rrbracket = \llbracket CI \rrbracket(\llbracket vazo \rrbracket)$$

$$\llbracket vazocu \rrbracket = \lambda x. \exists y Gen e vase(y) \wedge g_c(i)(e)(y) \wedge AG(e, x)$$

$$\llbracket vazocu \rrbracket = \lambda x. \exists y Gen e vase(y) \wedge sell(e)(y) \wedge AG(e, x)$$

4. Discussion. The suffix CI can take proper names as base nouns. This would be a type mismatch for the denotation if proper nouns are of type D_e . In (22a), the proto-agent is a follower of the political ideas of *Ecevit* and in (22b), the proto-agent is a fan of what *Alex* meant in sports terms³.

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|--|-----------------------------------|
| (22) a. Ecevit-çi | b. Alex-ci |
| E-CI | A-CI |
| ‘A follower of Ecevit’s political ideas’ | ‘A sports fan who roots for Alex’ |

³Bülent Ecevit was an influential politician and Alex(sandro) De Souza was a football player in the Fenerbahçe sports club in Turkey

The denotation I provided for CI is of type $D_{\langle et, et \rangle}$. A proper noun as base creates a type mismatch if one takes the denotation of proper nouns as of type D_e . As a solution to this problem, I propose that the proper nouns go under a type shifting in the derivations. Type shifting proper nouns is not a novel thing. In a conjunction where one of the conjuncts is a proper name and the other is a quantifier phrase, the proper noun needs to be type shifted to not violate Coordinate Structure Constraint (CSC) (Ross 1967). In (23), the quantifier needs to be raised at LF which is an extraction out of the conjunction. Using the denotation of D_e for the proper noun would violate CSC, so the proper noun is type shifted to a quantifier and it is also raised at LF.

(23) John and every man in the race exhausted themselves.

The type shifting I make does not go from D_e to $D_{\langle et, t \rangle}$ as it would in (23). I type shift the proper nouns from an individual D_e to a set of individuals $D_{\langle et \rangle}$, making a predication out of an individual (Partee 2008). I provide the type shifted denotation of a proper noun in (24). In this denotation, I use a generic relationship that is to be established with the proper noun. This way the denotation generates a set of individuals that is related to *Alex* or any other proper noun for that matter.

(24) $\llbracket Alex \rrbracket = \lambda x. relate(A)(x)$

The reading of $D_{\langle et \rangle}$ for proper nouns can be shown in other places in Turkish. I give an example in (25) where a proper noun is used in a place where a generic noun is used, and the end readings are similar. In both sentences, what is relayed is not being exactly *doktor* ‘doctor’ or *Alex*, it is the set of things that those two relate to.

(25)	a.	Doktor ol-mak zor-dur.	b.	Alex ol-mak zor-dur.
		doctor be-NMLZ difficult-COP		A be-NMLZ difficult-COP
		‘Being a doctor is hard.’		‘Being Alex is hard.’

The discussion of lexical integrity revolves around finding morphological structures that allow syntactic operations to target their parts, as they do words in sentences. As a consequence, the literature (Jackendoff 2002, Spencer 2005) focuses on places that are similar to phrase structures and morphologically derived. These places are then subjected to tests which are considered to be highly syntactic such as extraction and coordination. For example, an extraction of a noun out of a compound is not permitted, and affixes can not readily be conjoined (26). There could be contradicting examples to these in English or in other languages. The particular point that CI or (Y)ICI has a relation to lexical integrity is none of these.

(26) a. *Orange, she likes the _____ juice
 b. *He will de- and reconstruct the building.

One of the claims for a strict lexical integrity would be that syntactic operations do not take place in derivations (Bresnan & Mchombo 1995). The analyses I provided for (Y)ICI and CI are similar in how the composition is handled. In the case of (Y)ICI, if there is an internal argument it restricts the verb and it is existentially closed. The base verb is the main relation that the proto-agent noun and the internal argument holds. In the case of CI, the base noun restricts a relation that is assigned by the context and the internal argument is again existentially closed. From the point of semantic composition, both suffixes almost have a full alignment.

The semantic machineries used in the analyses of the suffixes are already used in the syntax. If the means of syntactic operations were to be invisible to morphology, these analyses wouldn't be possible. I argue that they cover the derivational meanings and can account for the data I provided.

A further step on analyzing agent nominalizers in Turkish could be to separate the suffix (Y)ICI into two existing suffixes *-(y)I* and *CI*. The suffix *-(y)I* takes verbs and derives nouns. It is a derivational nominalization (27). This is possible in principle, but there are derivational gaps. For example, the verb *ateşle* 'to ignite' can be the base for the suffix (Y)ICI but not for the suffix *-(y)I* (28). This can be treated as a lexical gap waiting to be addressed or an observation against parting the suffix (Y)ICI into two. I take the latter view and consider the gap as evidence against separability.

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|------|----|---|----|---|
| (27) | a. | kaz-mak
dig-NMLZ
'digging' | c. | sor-mak
ask-NMLZ
'asking' |
| | b. | kaz-ı
dig-(Y)I
'excavation' | d. | sor-u
ask-(Y)I
'question' |
| (28) | a. | ateşle-yici
ignite-(Y)ICI
'igniter' | b. | *ateşle-yi
ignite-(Y)I
Intended: 'fire' |

5. Conclusion. I provided two analyses that cover agent nominalizers (Y)ICI and *CI* in Turkish which have similar compositional properties. The analyses use semantic machineries utilized in the composition of sentences. The denotation for the Sakha agent nominalizer *-AAccI* (Baker & Vinokurova 2009) can not be taken as is, since it predicts unattainable readings in Turkish. Both analyses have properties that are available for the composition of sentences. This is the reason why these analyses are against strict lexical integrity view. In that sense, these analyses make a point against lexical integrity with compositional properties instead of an operational one like extraction.

References

- Baker, Mark C & Nadya Vinokurova. 2009. On agent nominalizations and why they are not like event nominalizations. *Language* 85(3). 517–556. <https://doi.org/10.1353/lan.0.0144>.
- Barker, Chris. 2000. Definite possessives and discourse novelty. *Theoretical Linguistics* 26(3). 211–228. <https://doi.org/10.1515/thli.2000.26.3.211>.
- Barker, Chris. 2019. Possessives and relational nouns. In Paul Portner, Klaus Heusinger & Claudia Maienborn (eds.), *Semantics - noun phrases and verb phrases*, 177–203. Berlin: De Gruyter Mouton. <https://doi.org/10.1515/9783110589443-006>.
- Bresnan, Joan & Sam A Mchombo. 1995. The lexical integrity principle: Evidence from Bantu. *Natural Language & Linguistic Theory* 13(2). 181–254. <https://doi.org/10.1007/bf00992782>.
- Chierchia, Gennaro. 1985. Formal semantics and the grammar of predication. *Linguistic inquiry* 16(3). 417–443.
- Chung, Sandra & William A Ladusaw. 2003. *Restriction and saturation*. Cambridge, MA: MIT

- Press. <https://doi.org/10.7551/mitpress/5927.003.0008>.
- Dayal, Veneeta. 2003. A semantics for pseudo-incorporation. *Ms., Rutgers University*.
- Dowty, David. 1991. Thematic proto-roles and argument selection. *Language* 67(3). 547–619. <https://doi.org/10.2307/415037>.
- Göksel, Asli & Celia Kerslake. 2004. *Turkish: A comprehensive grammar*. Abingdon: Routledge. <https://doi.org/10.4324/9780203340769>.
- Jackendoff, Ray. 2002. English particle constructions, the lexicon, and the autonomy of syntax. In Nicole Dehè, Ray Jackendoff, Andrew McIntyre & Silke Urban (eds.), *Verb-particle explorations*, 67–94. Berlin: De Gruyter Mouton. <https://doi.org/10.1515/9783110902341.67>.
- Kratzer, Angelika. 1996. Severing the external argument from its verb. In Johan Rooryck & Laurie Zarin (eds.), *Phrase structure and the lexicon*, 109–137. Berlin: Springer.
- Kratzer, Angelika. 2002. The event argument and the semantics of verbs.
- Maienborn, Claudia. 2011. *Event semantics*. De Gruyter Mouton Mouton. <https://doi.org/10.1515/9783110589245>.
- Öztürk, Balkız. 2005. *Case, referentiality and phrase structure*. Amsterdam: John Benjamins Publishing Company. <https://doi.org/10.1075/la.77>.
- Öztürk, Balkız. 2009. Incorporating agents. *Lingua* 119(2). 334–358. <https://doi.org/10.1016/j.lingua.2007.10.018>.
- Parsons, Terence. 1990. *Events in the semantics of English*. Cambridge, MA: MIT press.
- Partee, Barbara H. 2008. Noun phrase interpretation and type-shifting principles. In Paul Portner & Barbara H Partee (eds.), *Formal semantics*, 357–381. Oxford: Blackwell Publishers. <https://doi.org/10.1002/9780470758335.ch15>.
- Partee, Barbara H & Vladimir Borschev. 1998. Integrating lexical and formal semantics: Genitives, relational nouns, and type-shifting. *Proceedings of the second Tbilisi symposium on language, logic, and computation*.
- Ross, John Robert. 1967. Constraints on variables in syntax.
- Spencer, Andrew. 2005. Word-formation and syntax. In Pavol Štauker & Rochelle Lieber (eds.), *Handbook of word-formation*, 73–97. Berlin: Springer. https://doi.org/10.1007/1-4020-3596-9_4.
- Staub, Adrian. 2015. Reading sentences: Syntactic parsing and semantic interpretation. In Alexander Pollatsek & Rebecca Treiman (eds.), *The oxford handbook of reading*, 202–216. Oxford: Oxford University Press. <https://doi.org/10.1093/oxfordhb/9780199324576.013.15>.
- Vikner, Carl & Per Anker Jensen. 2002. A semantic analysis of the English genitive. interaction of lexical and formal semantics. *Studia Linguistica* 56(2). 191–226. <https://doi.org/10.1111/1467-9582.00092>.