

# A Nanosyntactic Approach to Transitivity Alternations

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*Snippet for More Advanced Syntax*

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## 1 Introduction

In this snippet, I propose a nanosyntactic analysis of the syncretic realization of passivization and anticausativization in Turkish, illustrated in (1) below.

- (1) Tabak kır-ıl-dı  
plate break- $\alpha$ -PST  
i. **Anticausative:** ‘The plate broke (e.g. from the wind/by itself).’  
ii. **Passive:** ‘The plate was broken (e.g. by John).’

This sort of syncretism poses a problem to realizational frameworks like Distributed Morphology where morphemes can only be inserted into the terminal nodes in a syntactic structure. To see the problem, consider the structures in (2) below. The only property that could group these two structures together is that they both lack an external argument.

- (2) a. [Pass [voice [ $v_{\text{cause}}$  [Root NP]]]]  $\rightarrow$  passive  
b. [ $v_{\text{cause}}$  [Root NP]]  $\rightarrow$  anticausative

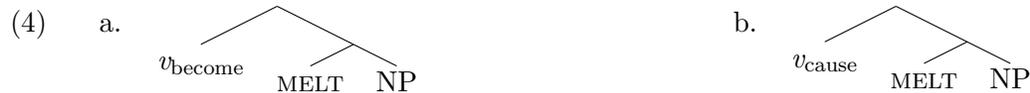
It is not clear how the missing head/projection in the anticausative structure in (2b) will be spelled out in the same way as the overt Pass head in (2a). The problem here should be obvious: There is no syntactic terminal where the syncretic passive/anticausative morpheme {-ıl} can be inserted in (2b). If we want to write a lexical entry for the passive/anticausative morpheme, we need to refer to a context like ‘missing external argument’ rather than a syntactic terminal (Embick, 2004). Making reference to the absence of a syntactic constituent for the purposes of lexical insertion is not the most desirable move, to say the least. In this snippet, I will present a realizational alternative which restricts lexical insertion to syntactic nodes and hence does not need the stipulation of insertion into non-existing nodes.

In Section 2, I present the relevant data from Turkish. In Section 3, I discuss the structures that I adopt for anticausatives and passives and show that it is possible to identify a semantic source for the syncretism under discussion. In Section 4, I lay out the basic assumptions regarding Nanosyntax and present the analysis that exploits the idea that there is a semantic commonality between the passive and anticausative morphemes.

## 2 Data

English exhibits morphologically unmarked causativity alternations as in (3). While lexicalist approaches maintain that causativity alternations take place in the lexicon, modifying the theta grid associated with a lexical item, Distributed Morphology argues that roots are devoid of such information and get the right construal depending on the functional nodes merged on top of them in syntax (Harley and Noyer, 2000) as in (4).

- (3) a. Susan melted the ice.  
b. The ice melted.



In Turkish, however, verbal roots come in two varieties with respect to their lexical specification for causativity (i.e. whether an external argument is present or not.).

- (5) i. causative roots: e.g. ‘kır’  $break_{tr}/*_{intr}$   
ii. anticausative roots: e.g. ‘don’  $freeze_{intr}/*_{tr}$

The basic causativity alternation schema is shown below. Morphologically simplex causative roots are the ones that require an external argument. Morphologically simplex anticausative roots are the ones that cannot take an external argument. The anticausative suffix is identified as  $\alpha$  below while the causative suffix is identified as  $\beta$  below.

	causative variant	anticausative variant
causative roots	$x$	$x+\alpha$
anticausative roots	$y+\beta$	$y$

The examples in (6) illustrate a morphologically simplex causative root and its anticausative version. Notice that the suffix [Il-]<sup>1</sup> semantically eliminates the external argument.

- (6) a. Zeynep tabak kır-dı  
Zeynep plate break-PST  
‘Zeynep broke a plate.’  
  
b. Tabak kır-ıl-dı  
plate break- $\alpha$ -PST  
‘The plate broke.’

The examples in (7) illustrate a morphologically simplex anticausative root and its causative version. Notice that the suffix [Dİr-]<sup>2</sup> introduces an external argument.

- (7) a. Su don-du  
water.NOM freeze-PST  
‘The water froze.’

<sup>1</sup> There are several allomorphs of this suffix due to vowel harmony and consonant dissimilation.

<sup>2</sup> Again, this suffix has several allomorphs.

- b. Zeynep suyu don-**dur**-du  
 Zeynep water.ACC freeze- $\beta$ -PST  
 ‘Zeynep froze the water.’

English-style morphologically unmarked causativity alternation is completely out in Turkish.

- (8) a. \*Zeynep suyu don-du  
 Zeynep water.ACC freeze-PST  
 Intended: ‘Zeynep froze the water.’
- b. \*Tabak kır-dı  
 plate break-PST  
 Intended: ‘The plate broke.’

In addition to these event structure modifications, Turkish also has a verbal passive construction. As is common cross-linguistically, the anticausativization marking is morphologically identical to the marking for passivization. Hence, we have the ambiguity below.

- (9) Tabak kır-ıl-dı  
 plate break- $\alpha$ -PST  
 i. **Anticausative**: ‘The plate broke.’  
 ii. **Passive**: ‘The plate was broken.’

It is possible to show that both construals are available. As shown in (10), the passive reading of the sentence allows a by-phrase that denotes the agent and is compatible with a purpose clause.

- (10) a. Tabak Zeynep tarafından kır-ıl-dı  
 plate Zeynep by break- $\alpha$ -PST  
**Passive**: ‘The plate was broken by Zeynep.’
- b. Tabak Zeynep’i suçlu gibi göstermek için kır-ıl-dı  
 plate Zeynep.ACC guilty like show for break- $\alpha$ -PST  
**Passive**: ‘The plate was broken to make Zeynep look guilty.’

Similarly, as illustrated in (11), the anticausative reading of the sentence is compatible with a ‘*by itself*’ phrase and *from*-PPs denoting the cause of the event.

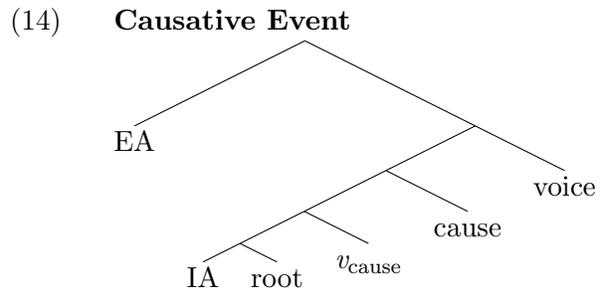
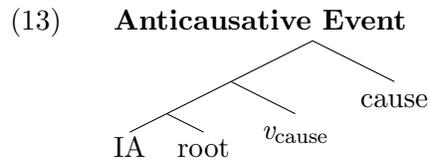
- (11) a. Tabak kendi kendine kır-ıl-dı  
 plate by itself break- $\alpha$ -PST  
**Anticausative**: ‘The plate broke by itself.’
- b. Tabak rüzgar-dan kır-ıl-dı  
 plate wind-from break- $\alpha$ -PST  
**Anticausative**: ‘The plate broke from the wind.’

Needless to say, we predict the combination of these phrases that identity passive vs. anticausative to be bad. This is borne out.

- (12) #Tabak Zeynep’i suçlu gibi göstermek için kendi kendine kır-ıl-dı  
 plate Zeynep.ACC guilty like show for by itself break- $\alpha$ -PST  
 #‘The plate broke by itself to make Zeynep look guilty.’

### 3 Proposed Structures and Their Compositional Semantics

In this section, I present the syntactic structures that I'll be assuming. I slightly modify the proposal in Deal (2009)<sup>3</sup>. Also see Pyllkkänen (2002) and Kratzer (2005), Alexiadou, Anagnostopoulou & Schäfer (2006).



The semantic denotations of the  $v_{\text{cause}}$  and **cause** are given below. (Note that  $v$  is the type of eventualities). Notice that the former introduces the causation relationship<sup>4</sup> whereas the latter existentially closes the caused event.

$$(15) \quad \llbracket v_{\text{cause}} \rrbracket = \lambda P_{\langle v, t \rangle}. \lambda e'. \lambda e. P(e') \text{ and } e \text{ directly-causes } e'$$

$$(16) \quad \llbracket \mathbf{cause} \rrbracket = \lambda R_{\langle v, vt \rangle}. \lambda e. \exists e' \text{ such that } R(e)(e')$$

A sample calculation is given below. Assume that the root is [melt] and the internal argument is [the ice]. The end result of the calculation below gives us the semantics of the anticausative/inchoative structure in (13).

$$(17) \quad \text{a. } \llbracket \text{melt} \rrbracket(\llbracket \text{the-ice} \rrbracket) = \lambda e. \text{melt}(e)(\text{the-ice})$$

$$\text{b. } \llbracket v_{\text{cause}} \rrbracket(\llbracket \text{melt-the-ice} \rrbracket) = \\ \llbracket \lambda P_{\langle v, t \rangle}. \lambda e'. \lambda e. P(e') \text{ and } e \text{ directly-causes } e' \rrbracket (\lambda e. \text{melt}(e)(\text{the-ice})) = \\ \lambda e'. \lambda e. \text{melt}(e')(\text{the-ice}) \text{ and } e \text{ directly-causes } e'$$

$$\text{c. } \llbracket \mathbf{cause} \rrbracket(\llbracket (17\text{b}) \rrbracket) = \\ \llbracket \lambda R_{\langle v, vt \rangle}. \lambda e. \exists e' \text{ s.t. } R(e)(e') \rrbracket (\lambda e'. \lambda e. \text{melt}(e')(\text{the-ice}) \text{ and } e \text{ directly-causes } e') = \\ \lambda e. \exists e' \text{ s.t. } \text{melt}(e')(\text{the-ice}) \text{ and } e \text{ directly-causes } e'$$

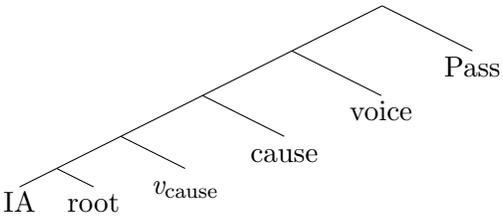
The causative structure in (14) is simply the addition of the Kratzerian voice layer on top of it:

$$(18) \quad \llbracket \mathbf{voice} \rrbracket(\llbracket (17\text{c}) \rrbracket) = \text{(by Event Identification)} \\ \lambda x. \lambda e. \exists e' \text{ s.t. } \text{melt}(e')(\text{the-ice}) \text{ and } e \text{ directly-causes } e' \text{ and } \mathbf{agent}(e)(x)$$

Assuming Bruening (2014), we can saturate the agent argument either by merging an NP or by existentially closing it by a passive morpheme. (19a) illustrates the semantic structure for passives.

<sup>3</sup> In Deal's paper, the **cause** is presented as an event argument that fills in the event slot introduced by the  $v_{\text{cause}}$  head. I propose that **cause** actually existentially closes the the event slot introduced by the  $v_{\text{cause}}$  head.

<sup>4</sup> Notice that it only introduces the causing event, not an agent.

- (19) a.  b.  $[[\text{PASS}]] = \lambda R_{\langle e, vt \rangle} . \lambda e. \exists x \text{ such that } R(e)(x)$

- (20)  $[[\text{PASS}]]((18)) = \lambda e. \exists x \exists e' \text{ s.t. } \text{melt}(e')(\text{the-ice}) \text{ and } e \text{ directly-causes } e' \text{ and } \mathbf{agent}(e)(x)$

Note the similarity between the  $[[\text{PASS}]]$  and  $[[\mathbf{cause}]]$  heads. While the passive head existentially closes an individual variable, the cause head existentially closes an event variable. Notice that if events, like individuals, are assumed to be part of the domain of entities, these two morphemes have the same semantics, both introducing existential closure.

- (21) a.  $[[\text{PASS}]] = \lambda R_{\langle e, vt \rangle} . \lambda e. \exists x \text{ such that } R(e)(x)$   
 b.  $[[\mathbf{cause}]] = \lambda R_{\langle v, vt \rangle} . \lambda e. \exists e' \text{ such that } R(e)(e')$

I claim that the ambiguity below stems from the possibility of inserting  $[\mathbf{1l}]$  into a PASS node or a **cause** node. In the next section, I show how we can implement this basic idea within the Nanosyntactic approach to spell-out.

- (22) Tabak kır-**1l**-di  
 plate break- $\alpha$ -PST  
 i. **Anticausative**: ‘The plate broke (e.g. from the wind/by itself).’  
 ii. **Passive**: ‘The plate was broken (e.g. by John).’

## 4 A Nanosyntactic Analysis

### 4.1 Background on Nanosyntax

Nanosyntax (Starke, 2009; Caha, 2009; Pantcheva, 2011) shares many of its assumptions with DM. Most importantly, it denies the existence of a generative lexicon. Hence, one could assume that it is essentially a non-lexicalist framework. However, it has a crucial difference from DM: the possibility of spelling out non-terminals.

In Nanosyntax, all instances of concatenation happens in syntax (i.e. there is no pre-bundling of abstract features in lexicon to be merged in syntax). However, morphemes may as well correspond to contiguous stretches/spans of syntactic terminals. Here are some toy lexical entries<sup>5</sup>:

- (23) a.  $\{\text{children}\} = [\text{PL } [\mathbf{n} \text{ CHILD}]]$   
 b.  $\{-s\} = [\text{PL}]$   
 c.  $\{\text{book}\} = [\mathbf{n} \text{ BOOK}]$   
 d.  $\{\text{went}\} = [\text{PST } [\mathbf{v} \text{ GO}]]$

Lexicalization is cyclic and is attempted after every instance of merge in syntax. There are two crucial principles of lexicalization: **Biggest Match Wins** and **Minimize Junk**.

As illustrated in (24), the Biggest Match Wins principle dictates that the syntactic structure in (24b) is to be lexicalized by the  $\text{Lex}_1[\mathbf{c} [\mathbf{b} [\mathbf{a}]]]$  as it is the only morpheme that matches the whole

<sup>5</sup> These lexical entries are acquired and stored as such. So the acquisition of a lexical item boils down to learning which stretch/span of heads/features it can match.

structure from top to bottom. It essentially overrides the potential spell-out by the combination of  $\text{Lex}_2 + \text{Lex}_3$ , which could in principle exhaustively spell-out the structure. Minimize Junk, on the other hand, ensures that  $\text{Lex}_4$  is not inserted as it is a worse candidate than  $\text{Lex}_1$  due to its ‘junk’.

- (24) a. Lexical entries:  
 $\text{Lex}_1 = [c [b [a]]]$ ,  
 $\text{Lex}_2 = [c]$ ,  
 $\text{Lex}_3 = [b [a]]$ ,  
 $\text{Lex}_4 = [d [c [b [a]]]]$   
 b. Syntactic Structure to be lexicalized:  $[c [b [a]]]$

Let us consider another scenario where cyclicity will prove to be crucial. If the cyclicity was not at play, the structure below would be spelled out only by  $\text{Lex}_2$ . Since each attempt at lexicalization is an independent cycle of search for the best match, the bi-morphemic structure is attained<sup>6</sup>.

- (25) a. Lexicon:  
 $\text{Lex}_1 = [c]$ ,  
 $\text{Lex}_2 = [d [c [b [a]]]]$   
 b. Syntax:  
 Merge  $[b] + [a] = [b [a]]$   
 Spell-out  $[b [a]] \leftarrow$  only possible candidate  $\text{Lex}_2$   
 Merge  $[c] + [b [a]]\{\text{Lex}_2\} = [c] \leftarrow \text{Lex}_1 + [b [a]]\{\text{Lex}_2\}$   
 OUTPUT:  $\text{Lex}_1 + \text{Lex}_2$

## 4.2 A Nanosyntactic Analysis

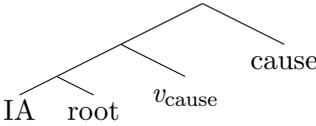
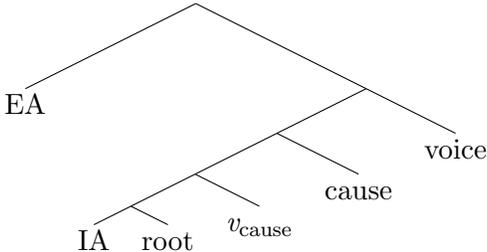
Given that lexical entries can correspond to spans of syntactic nodes, a lexically causative verb like  $[\text{kir}]$  and a lexically anticausative verb like  $[\text{don}]$  will have the lexical entries in (26).

- (26) a.  $\{\text{kir}\} = [[[[\text{BREAK}]v_{\text{cause}}]\text{cause}]\text{voice}]$   
 b.  $\{\text{don}\} = [[[\text{FREEZE}]v_{\text{cause}}]\text{cause}]$

I suggest that voice morpheme in Turkish can be spelled out as in (27).

- (27)  $\{-d\text{Ir}\} = [\text{voice}]$

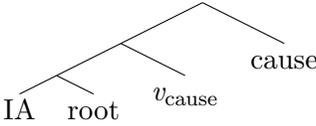
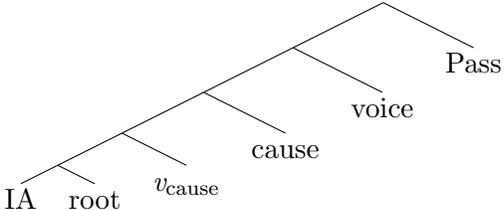
It should now be clear why causative *freeze* is bi-morphemic in Turkish and why  $\{\text{kir}\}$  does not combine with  $\{-d\text{Ir}\}$  to spell out the transitive structure in (28b).

- (28) a.  b. 

<sup>6</sup> However, note that if the lexicon had  $\text{Lex}_3 = [c [b [a]]]$ , it would be the winner matching the whole constituent with no junk. In general, if there is a no-junk match for the terminal just merged, it is inserted. That is, we do not calculate the junk of the previous matches, i.e. there is no global junk calculation. Junk is computed locally.

- (29) a. Syntax: [[[[FREEZE] $v_{\text{cause}}$ ]cause]voice]  
 Lexical Entries: {don} = [[[[FREEZE] $v_{\text{cause}}$ ]cause]; {-dIr} = [voice]  
 Lexicalization: {don}+{dIr}
- b. Syntax: [[[[BREAK] $v_{\text{cause}}$ ]cause]voice]  
 Lexical Entries: {kır} = [[[[BREAK] $v_{\text{cause}}$ ]cause]voice]; {-dIr} = [voice]  
 Lexicalization: {kır}

Now we want to derive the syncretic expression of derived anticausatives and passives:

- (30) a. 
- b. 

- (31) Tabak kır-ıl-dı  
 plate break- $\alpha$ -PST  
 i. **Anticausative**: ‘The plate broke (e.g. from the wind/by itself).’  
 ii. **Passive**: ‘The plate was broken (e.g. by John).’

Remember that the PASS and **cause** heads had the identical denotation except for the type of the argument they are existentially closing (i.e. individual vs. event). I assume that this sub-domain type distinction is ignored for the purposes of lexical insertion. Hence, I propose that -IL, defined as in (33) will be interpretable (will not lead to type mismatch) when it’s the sister of voiceP or  $vP_{\text{cause}}$ .

- (32) a.  $\llbracket \text{PASS} \rrbracket = \lambda R_{\langle e, vt \rangle}. \lambda e. \exists x \text{ such that } R(e)(x)$   
 b.  $\llbracket \text{cause} \rrbracket = \lambda R_{\langle v, vt \rangle}. \lambda e. \exists e' \text{ such that } R(e)(e')$
- (33)  $\llbracket -\text{IL} \rrbracket = \lambda R_{\langle \alpha, vt \rangle}. \lambda e. \exists \alpha \text{ such that } R(e)(\alpha)$ ,  
 where  $\alpha$  is type  $e$  or  $v$
- (34) a. Syntax: [[[[BREAK] $v_{\text{cause}}$ ]cause]  
 Lexical Entries: {kır} = [[[[BREAK] $v_{\text{cause}}$ ]cause]voice]; {-IL} = [pass/caus]  
 Lexicalization: {kır}+{-IL}
- b. Syntax: [[[[[[BREAK] $v_{\text{cause}}$ ]cause]voice]pass]  
 Lexical Entries: {kır} = [[[[[[BREAK] $v_{\text{cause}}$ ]cause]voice]; {-IL} = [pass/caus]  
 Lexicalization: {kır}+{-IL}

Notice that in (34a), the local junk computation ensures that the [cause] head is spelled out by {-IL} as it does not have any junk whereas its competitor for that node has [voice] as junk. If the junk calculation was global (or if {-IL} did not have the right semantic type), we would see unmarked anticausativization.

Finally, the impossibility of anticausative readings in verbal forms that bear the overt causative suffix (that spells out the **voice** head. [See (27)]) as shown in (35b), is predicted. The lexicalization proceeds as in (36).

- (35) a. Su don-du.  
           water freeze-PST  
           ‘The water froze.’
- b. Su don-**dur-ul**-du.  
           water freeze-PST  
           i. ‘The water was frozen.’ (verbal passive, implies human agent)  
           ii. \*‘The water froze.’
- (36) Syntax: [[[[[FREEZE] $v_{\text{cause}}$ ]cause]voice]pass]  
 Lexical Entries: {don} = [[[FREEZE] $v_{\text{cause}}$ ]cause]; {-DIR} = [voice]; {-IL} = [pass]  
 Lexicalization: {don}+{-DIR}+{-IL}

## 5 Conclusion

In this snippet, I have tried to lay out a novel approach to the cross-linguistically widespread syncretism between anticausative and passive morphemes. I have presented a realizational analysis for the passive-anticausative syncretism that does not refer to missing syntactic objects in syntax. In particular, I have entertained the idea that events with a  $v_{\text{cause}}$  layer have a CAUSE node that is very much like the Pass morpheme. While CAUSE existentially binds an event variable, the PASS morpheme existentially binds an individual variable. Essentially, I have argued that what connects these two operations is not a contextual rule like ‘The external argument is missing!, Insert  $\alpha$ !’ Hence, my analysis does away with contextual rules of morpheme insertion that ‘realizes’ a non-existing node in syntax.

## 6 References

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