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The pronominal clitic [dər] in Dutch: A theoretical and experimental approach*

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1. INTRODUCTION

Clitics are studied in a number of areas in linguistics, including phonology, syntax, and semantics. To this, we add the field of psycholinguistics. The present paper investigates the phonology and processing of verb-clitic constructions in Dutch. First, we describe in formal terms the prosodic characterization of the cliticization of *dər* ('her') to obstruent-final verb forms. The verb-clitic construction varies phonologically in the phrasal domain; sometimes the host and clitic behave as if they form a single word, and at other times, the host appears to be a separate phonological word and is therefore subject to phonological rules sensitive to word boundaries. Second, we discuss the role of the phonological representation of the verbs in the mental lexicon in processing these host-clitic constructions when they differ in their prosodic structure, having been subject to different phonological processes. We argue that the different prosodic structures do not affect the parsing and processing of the verb-clitic constructions; rather, processing time depends on whether the cliticized form corresponds to the underlying representation of the verb stem.

To our knowledge, this is the first attempt to combine psycholinguistic research with a formal account of verb-clitic constructions. As such, our experimental results are tentative and should be viewed as the beginning of a research program rather than a definitive conclusion.

2. THE *d*-INITIAL CLITICS

Dutch has a number of *d*-initial clitics like *dər* 'her', *də* 'the', and *die* 'that'. The initial consonant of these clitics can vary in voicing. We are primarily interested in the clitic *dər* whose strong form is *haar*. We will refer to the other clitic forms only when it is necessary to draw attention to a particular contrast.

When the clitic *dər* attaches to a preceding verb, this host-clitic construction can lead to voicing alternations on the surface as shown in (1).

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(1) voiced/voiceless alternation in *dər*

a.	ik zoek haar auto	[zugdər]	[zuktər]	'I look for her car'
b.	ik krab haar niet	[krabdər]	[kraptər]	'I do not scratch her'
c.	ik bel haar op	[bɛldər]	*[bɛltər]	'I call her'
d.	ik ken haar	[kɛndər]	*[kɛntər]	'I know her'

The voiced/voiceless alternation occurs when the clitic typically attaches to a host which ends in an obstruent (1a and 1b), but not when the host ends in a liquid (1c) or nasal (1d). There are two aspects of these data that we wish to note. First, if the verb ends in an obstruent, the consonant cluster in the host-clitic form can be either voiced or voiceless, as in (1a) and (1b). Second, interacting with this fact, both underlying voiced (1b) and voiceless (1a) stem-final obstruents of the verb can surface as either [+voice] or [−voice] forms in this host-clitic construction. Thus, the clitic not only varies in the voicing of its initial consonant, but has an effect on the voicing pattern of the host as well. A pair of cliticized forms with voiced and voiceless stem-final verbs is shown in (2):

(2) Underlying voiceless and voiced verb stems

knijp 'pinch'	: /p/	[knɛiptər]	[knɛibdər]
krab 'scratch'	: /b/	[kraptər]	[krabdər]

Gussenhoven (1986) and Berendsen (1986) have persuasively argued that the *dər* form is not phonologically reducible from *haar*; rather, the unstressed clitic form is present in the lexicon. We will briefly discuss the proposals presented in Berendsen (1986) and Gussenhoven (1986, 1989) to account for the voiced and voiceless alternations.

Berendsen (1986) argues that reduced clitics, in general, can either be incorporated with the host to the left to form a single phonological word (P-w, or ω) or be part of a following phonological phrase (P-ph, or ϕ). The prosodic category, however, does not determine the voiced or voiceless nature of the clusters; both can occur by either P-word or P-phrase formation. Rather, variation in voicing occurs due to the application of different phonological rules.[1] Thus, regardless of whether the verb and clitic constitute a single P-word or separate phonological phrases, this analysis redundantly allows both voiced and voiceless clusters to surface.

Contrary to this analysis, Gussenhoven (1986) argues that the voicing of the clitic-initial consonant (and, consequently, the final consonant of the preceding word) depends on the prosodic category of the string. The voicing depends on whether the clitic and the host form one phonological word or two separate phonological words. Gussenhoven follows Zonneveld's (1983) proposal in assuming that the voiceless cluster can be explained on the basis of P-word formation, since obstruent clusters are generally voiceless within words. On the other hand, if the verb and clitic constitute two separate P-words, then the rule of regressive assimilation applies

postlexically, and the cluster in the cliticized phrase becomes voiced. The derivations (as inferred from Gussenhoven) are given in (3):

(3) Voiceless/voiced alternation following Gussenhoven (1986)

	krab dər	krab dər
FD	p	p
P-word formation	$[krapdər]_ω$	$[krap]_ω[dər]_ω$
RA	–	$[krab]_ω[dər]_ω$
Vcl. cluster form.	$[kraptər]_ω$	

This is more intuitive than Berendsen's analysis which gives both prosodic possibilities, but misses the generalization of the voiceless cluster condition as part of phonological word formation. Note that final devoicing is a lexical rule (Booij 1985) and applies before cliticization.

Gussenhoven (1989) captures this generalization of voiceless cluster formation as being P-word formation and voiced otherwise, with a more explicit rule of P-word formation based on Selkirk's edge-based theory of syntax-phonology mapping (Selkirk 1986, Selkirk & Shen 1990). In Selkirk's theory, at the postlexical level, the language chooses which syntactic category X serves as the basis for the construction of a prosodic category C, and whether the right or left edge of X coincides with that of C. Gussenhoven (1989) argues that the P-word formation in Dutch is as follows:

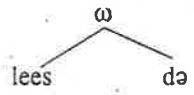
(4) P-word formation (Gussenhoven, 1989)
P-word: {Left; X^0}

According to this formulation, the left edge of an X^0 category (i.e. every major class item) will begin a P-word. Moreover, it predicts that the right edge of a major lexical category does not necessarily induce a P-word boundary. This nicely accounts for the fact that function words like *də* cliticize onto the P-word on their left. In a sentence such as *ik lees de krant*, the P-word boundaries would be as in (5)

(5) Ik lees de krant 'I read the newspaper'
P-word [[[

The article *də* encliticizes to the preceding verb and not to the following noun. This analysis predicts that segmental rules that are sensitive to P-word boundaries (like regressive assimilation) will not apply to combinations of major class words and function words. The incorporation of the *də* leftwards into the verb *lees* leads to the structure in (6):

(6)



Consequently, under this analysis, the sentence *ik lees dər krant* with the clitic *dər* would undergo P-word formation as in (7).

(7) ik lees dər krant 'I read her newspaper'
P-word [[[

The clitic *dər* is then incorporated to the preceding verb to become a single P-word and is subjected to the voiceless cluster constraint.

However, as we noted earlier, *dər* can surface with both a voiced and a voiceless initial consonant. To account for this variation, Gussenhoven (1989) suggests that additional constituents may be introduced as a function of speech style or tempo. Thus, in slow or formal speech, a new P-word boundary would be introduced before *dər* in (7), preventing it from becoming incorporated with the preceding P-word. Instead, it becomes an appendix to the following noun. The two separate P-word edges for the verb and clitic would then allow regressive assimilation to apply, resulting in a voiced cluster. We should point out that Gussenhoven's example for an optional P-word edge was in reference to the article *də* and not the clitic *dər*. However, the same reasoning should apply.

The analysis described above leaves a problematic gap in those cases where *dər* is final in an utterance. For function words like *də*, the voiceless and voiced alternation can be accounted for depending on whether the article is incorporated with the preceding or the following P-word, since the article cannot occur utterance-finally. However, the clitic *dər* as an object pronoun can occur at the end of a sentence with either a voiced or a voiceless cluster. The pair of sentences in (8) allow both possibilities.

(8) a. ik zoek dər krant 'I look for her newspaper'
[zugdər]
[zuktər]
b. ik zoek dər 'I look for her'
[zugdər]
[zuktər]

In (8a), according to Gussenhoven, the voiced cluster would occur if (due to formal speech or slow tempo) a separate P-word boundary was forced before *dər* which is then an appendix to *krant*. However, in (8b), the *dər* would be stranded, without a host to attach to. The problem seems to be that under this story, if *dər* is associated with the verb, it becomes a P-word with the verb; otherwise, although the clitic itself cannot be a P-word, there must be a P-word break to allow for regressive voicing assimilation to apply. In the latter case then, the clitic is not associated to any prosodic category. Clearly, there is a strong association between *dər* not being incorporated with the preceding P-word and the context in which voicing assimilation applies. It seems, therefore, that before we can assess the status of *dər* when

it does not form a P-word with its host, we need to look at the facts about voicing assimilation in more detail.

The postlexical rule of regressive voicing assimilation (RA) applies obligatorily within compounds, and optionally across any P-words within a P-phrase. The following sentences show where RA can or cannot apply.

(9) a. meetband 'measuring tape'
[db]
*[tp]
b. ik vind Rob dun 'I find Rob thin'
(i) $[[rob]_\omega\ ]_\phi$ $[[dun]_\omega]_\phi$
[pd]
(ii) $[[rob]_\omega$ $[dun]_\omega\ ]_\phi$
[bd]
(iii) *[pt]

In (9b), *Rob* undergoes final devoicing, and RA can optionally apply. RA does not apply in 9b(i), but does apply in 9b(ii) when *Rob* forms a single P-phrase with *dun*, resulting in a voiced cluster. However, a voiceless cluster would not be permissible since the words could not become a single P-word.

The clitic *dər*, however, always triggers RA if it is not incorporated with the preceding P-word. Compare the following sentence pairs in (10).

(10) a. ik kies Daan
(i) $[[kies]_\omega\ ]_\phi$ $[[Daan]_\omega\ ]_\phi$
[sd]
(ii) $[[kies]_\omega$ $[Daan]_\omega\ ]_\phi$
[zd]
b. ik kies dər
(i) $[kies\ dər]_\omega$
[st]
(ii) $[[kies]_\omega$ $dər]_\phi$
[zd]
(iii) *[sd]

Notice that unlike (10a), where the final consonant of *kies* can retain its voiceless status if it does not form a single P-phrase with the preceding word, in (10b) RA must apply. Thus, unlike a P-word, *dər* cannot begin a P-phrase. Rather, it must obligatorily form a single P-phrase with its host, but not be incorporated with it as a single P-word if it triggers RA. In fact, *dər* does not behave like any other P-word and should not be treated as one. We can, therefore, summarize our observations regarding cliticization, P-word formation, and regressive assimilation that any analysis must capture.

(11) P-word formation and voicing assimilation with *dər*

a. either *dər* attaches to the preceding P-word to form a single P-word leading to an internal voiceless obstruent cluster;

b. or *dər* triggers voicing assimilation which suggests that it follows a P-word;

c. *dər* cannot be a P-word on its own since unlike P-words
   (i) it is unstressed
   (ii) it triggers voicing assimilation if it is not incorporated into a single P-word with its host
   (iii) it cannot occur sentence-initially as a topicalized noun (only the strong form can occur: *Haar* ken ik niet)

These facts lead us to the conclusion that in both instances *dər* is closely associated with the preceding P-word and does not form a P-word itself. Either it is totally incorporated with its host or it is associated with its host but is not subject to word-internal processes. Instead of assuming that there is a forced P-word break between the host and the clitic (as proposed by Gussenhoven), the above facts can be satisfactorily incorporated in the clitic-formation analysis advocated by Inkelas (1989), who argues that all cliticization is either P-word or P-phrase formation. According to Inkelas (1989), there are two options in the way clitics can be attached to their hosts. Clitics can either attach to a prosodic category and are incorporated into it, or upon combining with the host, they can remain outside the constituent they become part of. In remaining outside the domain of the constituent which they form, they remain "invisible" to the rules applying within that domain. Inkelas (1989) gives two examples of cliticization to P-phrases. In Hausa, the clitic [fa] attaches leftwards onto a P-phrase and is incorporated into it. On the other hand, in Kivunjo Chaga, clitics combine with the preceding P-phrase but land outside the phrase.

Inkelas also provides examples where the host is a P-word. In Serbo-Croatian, the clitic gets incorporated into the preceding word (Zec & Inkelas 1990). However, to our knowledge, there are no examples in the literature where the clitic can be added to a P-word, but occurs outside the constituent, analogous to the clitic in Chaga which attaches to the P-phrase but is not incorporated into it. Dutch seems to provide both options. The clitic *dər* can attach leftwards to a P-word and be incorporated into it, or the P-word can be the host but the clitic lands outside it. We assume that the clitic *dər* has the following two possibilities of attaching to a preceding P-word host (or subcategorization frames in Inkelas' (1989) framework).

(12) Optional P-word cliticization of *dər*

a. [[ ]$_\omega$ dər]$_\omega$

b. [[ ]$_\omega$]$_\omega$ dər

The first possibility under (12a) would lead to voiceless clusters since the host and clitic become a single phonological word. In the second instance (12b), the *dər*

attaches to a P-word, forms a P-word constituent, but remains outside it – in Inkelas' terms, it is an invisible P-word clitic and, therefore, is not sensitive to within-word phonological rules. However, if the clitic lands outside the P-word, it is invisible to the domain of voiceless cluster formation; instead, it can trigger regressive voicing assimilation which is not a P-word internal rule.

This analysis has the advantage that it can account for the optional behavior of RA while not having to suggest special status for *dər* when it follows a P-word boundary. Since RA applies within a P-phrase, this accounts for the difference between *dər*, which does not induce a P-phrase break, and P-words which can be independent P-phrases (cf. 10 and 11). Also, Gussenhoven's intuition concerning the cliticization being P-word formation is maintained – in both instances, it is P-word formation. The difference lies in whether the clitic is or is not invisible to P-word internal phonological rules.

We should note that the facts are also consistent with a clitic-group analysis (Nespor and Vogel, 1986; Hayes, 1989), with some modifications. The clitic group consists of a non-clitic P-word with adjacent clitics which are P-words. This constituent falls between the P-word and the P-phrase in the prosodic hierarchy. For *dər*, under a clitic-group account, one could argue that cliticization leads to P-word formation resulting in voiceless clusters, while the voiced clusters are the result of a clitic-group formation. However, if the clitic-group definition is taken literally (i.e., if the clitic has to be a P-word), then *dər* cannot form a clitic-group since it is not a P-word (see (11c)). If, however, the definition is modified such that clitics like *dər* need not necessarily be P-words, then the clitic-group analysis is synonymous with the analysis we proposed earlier, where the clitic becomes a P-word with its host, but occurs outside the constituent.

There appear to be two advantages to our proposal compared to the clitic-group analysis. First, within the clitic-group analysis, two separate prosodic categorizations are needed for the same clitic. It seems as if the two surface forms of the clitic are unrelated. In our analysis, it is clear that cliticization is a single prosodic process – namely, P-word formation. The only difference lies in whether the clitic is incorporated into the P-word or is invisible. Second, unlike the clitic-group analysis, where a separate prosodic category is introduced, no intermediate prosodic category is needed between the P-word and the P-phrase.[2] At least for Dutch, unless there is independent motivation for the clitic-group, it seems more parsimonious to account for the facts concerning *dər* within our proposal that cliticization is P-word formation.

In sum, what is important for our purposes is that *dər* is attached to a verbal P-word host in two different ways. It can be incorporated as a single P-word with its host or it can land outside the P-word. These two structures lead to different phonological effects – a voiceless cluster as contrasted to a voiced cluster, respectively.

In the next section, we examine the processing consequences of these different prosodic structures.

3. PROCESSING CONSEQUENCES OF CLITIC CONSTRUCTIONS

The two different prosodic characterizations of the host plus *dər* forms lead to different surface representations – host and clitic being incorporated into a single P-word results in a cliticized form with a voiceless cluster, while a clitic attached to, but landing outside a P-word results in a clitic form with a voiced cluster. As stated earlier, both prosodic structures are well-formed for underlyingly voiceless as well as voiced stems. Thus, verb-clitic constructions of underlying voiceless stems can surface with voiceless or voiced clusters, and the same holds for verb-clitic forms of underlying voiced stems. A first attempt was made to investigate whether the difference in the phonological status of the two cliticized forms or the voicing nature of the verb stems have any processing consequences.

On encountering either the voiced or voiceless form of a verb plus clitic construction, listeners must be able to parse this surface form before individual lexical items are recognized. Consider the following pair of sentences:

(13) Prosodic structures and surface forms of *dər* with different verb stems

		optional prosodic structures	
		I	II
		[[verb] dər]	[[verb]] dər
a.	ik kus dər (UR: /kœs/)	[kœstər]	[kœzdər]
b.	ik kies dər (UR: /kiz/)	[kistər]	[kizdər]

Both phrases *ik kus haar* ('I kiss her') and *ik kies haar* ('I choose her') can be cliticized in two ways when the pronominal is reduced to *dər*. This occurs regardless of the difference in the underlying representation (UR) of the two verbs, voiceless for /kœs/ and voiced for /kiz/. The parsing of the cliticized forms and the eventual recognition of the verb forms may be affected by two factors – the prosodic character of the string, or the relation of the surface form to the underlying representation of the verb.

Under the first hypothesis, the different prosodic structures would affect processing such that listeners may prefer one type of prosodic structure over the other. For instance, regardless of the underlying voicing characteristics of the verbs /kœs/ and /kiz/, it could be the case that the forms under prosodic structure I are preferred over those under prosodic structure II in (13). Alternatively, however, the difference between the surface phonological form of the verb and its underlying lexical representation may affect processing, assuming, of course, that these verbs have a unique underlying representation in the mental lexicon. This would be the case if for (13a) listeners preferred I over II, but the reverse would be true for the (13b) sentences. This would suggest that processing time is not affected by cliticization

leading to a particular type of prosodic structure, but rather by the correspondence of the surface form to the underlying representation of the verb.

To address these questions, an auditory lexical decision experiment was conducted using a priming paradigm. In general, in a priming experiment, a prime item is presented to subjects followed by a target item. It has been shown that response time to a target item is faster when preceded by a related prime item as compared to an unrelated prime item. For instance, in a semantic priming experiment, subjects respond to a word like *doctor* faster if it is preceded by a related word *nurse* than an unrelated word such as *bread* (Meyer & Schvaneveldt 1971). Priming effects have been found using a variety of tasks. The present experiment employed a lexical decision task, in which subjects were asked to indicate as quickly as possible whether a particular target string is an existing word or not. Listeners had to make a lexical decision to a target item which was preceded by one of the two clitic forms as a prime. Using such a priming paradigm, we investigated how the processing of the clitic forms affected response times to a target item.

The structure of the experiment was as follows. A cliticized form (the entire sentence) – with either a voiced or voiceless consonant cluster – was presented as the prime, followed by the imperative form of the same verb as the target. For example, subjects would make a lexical decision to the target [kœs] that was preceded by either [Ikœstər] or [Ikœzdər] as the prime. Similarly, subjects would hear [kis] preceded either by [Ikistər] or by [Ikizdər]. Of course, the same subject did not hear both voiceless and voiced primes of the same verb. The test contained 48 trials. Half of these trials consisted of test trials and the other half of filler items. For the test trials, seven verbs ended underlyingly with /s/, seven with /z/, five with /p/, and five with /b/.

As shown in (14), for each underlying stem, two forms can surface corresponding to the difference in prosodic structures. One form matches the underlying representation in terms of voicing, and the other form mismatches the underlying representation in terms of voicing.

(14) Summary of experimental conditions

	PRIME	TARGET	PRIME AND VERB REPRESENTATION MATCH
a.	ik [[kœstər]$_\omega$]		+
/s/		[kœs]	
b.	ik [[kœz]$_\omega$ dər]		–
c.	ik [[kistər]$_\omega$]		–
/z/		[kis]	
d.	ik [[kiz]$_\omega$ dər]		+

If prosodic structures are playing a role in processing such that listeners favor one type of cliticization process, for example, the one that has only voiceless clusters as

its output, responses to the clitic forms with voiceless clusters (14a and 14c) should be faster than those to forms with voiced clusters (14b and 14d), regardless of the underlying voicing of the verb stem. If, however, the underlying representation of the verb stem plays a role, we might expect facilitation for the voiceless clitic forms of underlyingly voiceless verbs (i.e., 14a faster than 14b), and the voiced clitic forms of underlyingly voiced forms (i.e., 14d faster than 14c). Notice that listeners are responding to the same target item for the two different primes. The comparison in response latencies is therefore made on the exact same lexical item.

The analysis of response latencies to these four conditions enabled us to determine whether listeners based their decision on the phonological-word status of the cliticized forms, or on the underlying representation of the verb stem. Our results indicate that response latencies were faster when the cliticized form matched the underlying representation in terms of voicing. As shown in Figure 1, for verbs which underlyingly end in *voiced* obstruents (/z, b/), responses to the voiced clitic forms were faster than responses to the voiceless clitic forms. That is, responses to targets such as [kis] were faster when preceded by primes like (14d) as compared to (14c). Similarly, for verbs which underlyingly end in voiceless obstruents (/s, p/), responses to the *voiceless* clitic forms were faster than responses to the voiced clitic forms. That is, responses to targets such as [kœs] were faster when preceded by primes like (14a) as compared to (14b).

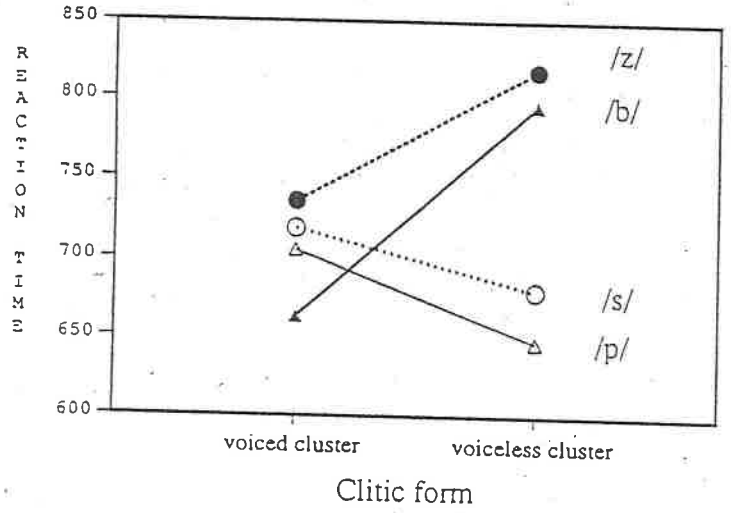


Figure 1. *Reaction times (in ms) to the voiced and voiceless clitic forms as a function of their underlying stem-final consonants (/p, b, s, z/).*

Interestingly, the prosodic characteristics of the verb plus clitic constructions per se did not affect response latencies. That is, listeners did not show a preference for a construction where either verb plus [dər] are incorporated into a single P-word (with

voiceless clusters), or where [dər] lands outside the P-word (with voiced clusters). Moreover, a simple surface match between prime and target did not facilitate responses, since reaction times to [kistər]-[kis] and [kœstər]-[kœs] are not faster relative to their voiced counterparts.

The present data show that there is an asymmetry in response latencies to the same imperative form of the verb, depending on whether the listener has heard (and presumably parsed and recognized the individual lexical items) the surface form which matches the representation of that verb. Phonologically, the verbs which alternate in voicing under given phonological contexts (word-finally vs. word-medially, cf. [kis] vs. [kizən]) are assumed to have a single voiced underlying stem-final consonant. On the surface, however, as an isolated word they are never voiced. One might assume that in the mental lexicon the voiced consonant is never present stem-finally, but rather occurs only in forms like the infinitive. Our results, however, appear to provide some initial support for an opposing view in which the voicing is, indeed, represented on the stem-final obstruents in the mental lexicon and plays a role in the recognition process.

The fact that no particular prosodic structure and the resulting postlexical processes (voicing assimilation or voiceless cluster formation) was preferred is understandable, since these cliticization processes are optional and listeners should be equally familiar with both. The asymmetry in the response latencies appears to be due to the underlying phonological representation of the verb stems, which suggests that the lexical representations of these stems are not optional in the same way.

4. CONCLUSION

We have argued that cliticization with *dər* is phonological word formation. However, the cliticization can lead to two types of prosodic structures. On the one hand, the clitic is attached to the preceding P-word and is incorporated into it. Alternatively, it can attach to the P-word but land outside it and remains invisible to rules applying within that phonological domain. Our proposal is analogous to Inkelas's (1989) analysis of clitics which appear to attach to P-phrases in two different ways. In Dutch, both options occur for the clitic *dər*, in which the prosodic constituent acting as a host is a P-word rather than a P-phrase.

These two options lead to different phonological surface forms when the stem-final consonant of the verb is an obstruent, since the phonological processes that apply to them are not the same. If the clitic is incorporated into the preceding P-word, the cliticization leads to voiceless clusters. When the clitic lands outside the P-word, regressive voicing assimilation applies, resulting in voiced clusters. These processes effectively neutralize the voicing distinction in the verb stems.

In a processing study, we attempted to investigate whether the different prosodic structures affected parsing and recognition of the verbs. We found that the surface

prosodic constituents did not affect processing time – rather, what contributed to the difference was the voicing characteristics of the lexical representation of the verb stems. This seems to support the view that lexical representations which are not variable but are unique appear to play a significant role in processing.

NOTES

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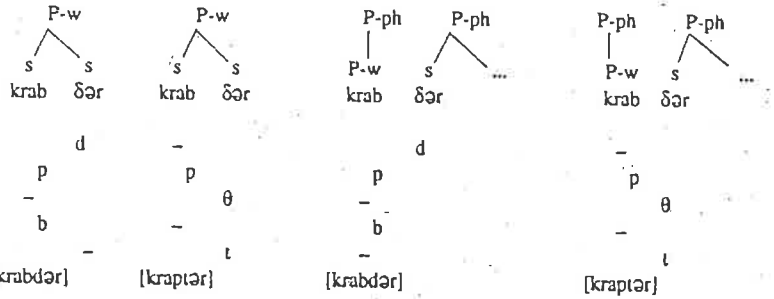
1. This analysis gives four possible derivations when applied to the dər clitics. The rules that operate on the forms include final devoicing (FD), regressive assimilation (RA), progressive assimilation (PA), and a rule of 'vacillation' (Vacil.) which optionally changes the initial consonant of the clitic. The analysis using the rule of 'vacillation' is based on Zonneveld's (1983) proposal that the underlying initial consonant of the clitic *dər* is a voiced fricative /ð/. Zonneveld (1983) assumes that all non-lexical items beginning with underlying /ð/ are changed optionally by a 'vacillation' rule to [d]. At the end of the derivation, the /θ/ resulting from PA is changed by absolute neutralization (Neutr.) to [t]. The relevant derivations are given below:

Derivations of [kraptər] and [krabdər] following Berendsen



2. See Inkelas (1989) for a more detailed discussion of the redundancy of clitic groups.

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