

**Processing Negative Imperatives in Bulgarian –
Evidence from Normal, Aphasic and Child Language**

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Processing negative imperatives in Bulgarian – Evidence from normal, aphasic and child language

1. Introduction

Functional elements like inflectional affixes, conjunctions, pronouns and modal particles have a very special role in language. They impose structure on a string of content words, gluing them together into a meaningful utterance. Usually, functional elements are categorised as members of the closed class vocabulary and further, with respect to their positional behaviour, as free or morphologically bound items. Independently of their status as independent words, clitics or affixes, the functional elements may be seen as a means to express the speaker's deixis, her concerns and knowledge source in order to update the hearer's information and to modify the common ground. The sentence-structuring and discourse-building functions of closed class elements must be readily accessible during sentence processing given the fast and automatic nature of the syntactic processes they trigger. The incremental nature of sentence processing raises questions about the way the information of incoming functional elements is accessed and subsequently employed for building the syntactic structure which sustains interpretation processes.

The present work approaches these questions by investigating the negative particle *ne* used for sentential negation in Bulgarian and its impact on the overt realisation and the interpretation of other closed class elements, such as bound aspectual morphemes and clitic pronouns. For this purpose we selected negative imperative structures as our linguistic basis. In Bulgarian, synthetic negative imperative sentences are subject to rigid syntactic and morphological well-formedness constraints. The scope of negation is reflected in the morphological form and the word order of the predicate and its pronominal objects which are distinct from those in positive imperatives. Negative imperatives represent in a dense form two phenomena the investigation of which grants access to the syntactic, semantic and prosodic processes triggered by negation during sentence processing. Firstly, negative imperatives present a context of overt aspectual coercion exclusively requiring imperfective predicates. Secondly, proclitic negation attracts clitic pronouns from their post-verbal positions and forms with them a rigidly structured clitic cluster in front of the verb. Using experimental methods, this work investigates how children, neurologically unimpaired and aphasic adult speakers process negative imperatives in order to achieve an appropriate structural representation and a coherent interpretation. It sheds light on questions concerning the scope relations between negation, imperative force and aspect by investigating the way their overt morphological reflexes are acquired and processed. The comparison with language acquisition data and with

normal processing patterns allows for a better understanding of the mechanisms which sustain structure building and interpretation of negative imperatives during agrammatic sentence comprehension.

In the following we present four studies which elaborate on the properties of Bulgarian negative imperatives and on the processing requirements they impose on speakers and listeners. In the study "Aspectual coercion in Bulgarian negative imperatives" (Kuehnast 2008) we argue against existing socio-pragmatic accounts of the well-formedness constraints on negative imperatives and propose that the aspectual restriction originates in the intrinsic organisation of the TAM system in Bulgarian. Based on cross-linguistic comparisons and on the close functional inspection of the morphological aspectual inventory in Bulgarian, we show that negative imperatives are instances of morphologically overt aspectual coercion as reflected in the mandatory imperfectivity marking of the predicate.

The study "Acquisition of negative imperatives in Bulgarian – implications for verbal aspect" (Kuehnast in press) investigates cross-sectionally how Bulgarian pre-school children combine elements of modality, negation and verbal aspect in order to arrive at the target use of negative imperatives. Employing an elicitation task, we explore the production of verbal aspectual affixes in negative commands. We assume that qualitative changes in the imperfectivisation strategies children apply to different types of perfective verbs reflect their growing ability to integrate negation into the aspectual construal of bounded predicates and to express the fine perspective-shift specific for the interpretation of negative imperatives by means of morphologically complex verbs.

The studies "Processing negation and aspect in Bulgarian – Evidence from normal and agrammatic sentence comprehension" (Kuehnast 2003) and "Processing clitic pronouns in Bulgarian – Evidence from normal and agrammatic comprehension" (Kuehnast 2009) target the morpho-syntactic and phono-syntactic effects of negation on normal and agrammatic processing of imperative sentences in an online comprehension task. In the first study, "Processing negation and aspect in Bulgarian – Evidence from normal and agrammatic sentence comprehension" (Kuehnast 2003), we examine the abilities of the two groups to parse the syntactic dependencies between negation, mood and aspect markers in order to get a closer look into the way predicates containing semantically conflicting aspectual affixes are accessed and integrated into the sentential structure. Based on the finding that the normal and agrammatic data reveal significant differences in processing speed but similar processing patterns, we elaborate on the hypothesis that comprehension problems in agrammatism are better explained in terms of a slowed-down implementation of syntactic operations which affects the course of information integration during online sentence comprehension. The second study, "Processing clitic pronouns in Bulgarian – Evidence from normal and

agrammatic comprehension" (Kuehnast 2009), contributes further evidence to this hypothesis by investigating normal and agrammatic comprehension of the phono-syntactic restrictions on clitic placement under negation and by comparing the processing load of personal and reflexive clitics in imperative clauses. Both clitic types occupy the same syntactic position, but only reflexive clitics trigger syntactically motivated co-reference establishment, the personal clitics being solely parsed as object agreement markers in the employed experiment. The increased processing load associated with the reflexive clitics reflects the additional referent identification processes which take place during the incremental comprehension of reflexive imperative constructions.

Each of the four studies, thus, contributes some specific aspects to the central research question: How do young, adult and agrammatic speakers of Bulgarian process the different types of information supplied by negation, imperative inflexion and aspectual affixes in order to construct the target representation of negative imperatives, which prototypically convey an internal perspective towards a potentially bounded event?

2. What is special about Bulgarian negative imperatives?

Bulgarian features preverbal negation expressed by the negative particle *ne*, which in case of sentential negation procliticises on the verb (1). If there are pronominal object clitics, negation attracts them from their otherwise post-verbal positions (2) and forms with them a clitic cluster. The cluster itself procliticises on the verb (3).

- (1) Ne viždam_{1SG PRES IMPF} deteto.
'I don't see the child.'
- (2) Viždam_{1SG PRES IMPF} go_{CL 3SG ACC MASC/NEUTR}.
'I see him/it.'
- (3) Ne go_{CL 3SG ACC MASC/NEUTR} viždam_{1SG PRES IMPF}.
'I don't see him/it.'

The clitic behaviour remains the same in indicative and imperative clauses which supports the view that negation is base-generated as a head in a functional projection dominating the tense projection (Tomić 2007, Werkmann 2003).

Bulgarian features the Slavic type of verbal aspect represented in the opposition of perfective and imperfective verbs. In contrast to other Slavic languages which employ bare (formally present tense) perfective verbs to express historic present and future tense, Bulgarian bare perfective verbs do not appear as predicates of main clauses but need additional finiteness markers. Consider the future reading in the Russian example in (4) which cannot be obtained

from the equivalent Bulgarian sentence with a simple perfective verb (5), but must be expressed by the future auxiliary *šte* 'will' (6).

- (4) Ty razbjoš_{2SG PRES PF} čašku. (Russian)
'You are going to break the cup.'
- (5) * Ti sčupiš_{2SG PRES PF} čašata. (Bulgarian)
'* You break the cup.'
- (6) Ti šte_{AUX FUT} sčupiš_{2SG PRES PF} čašata. (Bulgarian)
'You will / are going to break the cup.'

Perfective and imperfective verbs may be derived from each other by means of aspectual affixes. Both perfective affixes and imperfective suffixes are used productively, but only the latter have reached inflectional status. Derived imperfective verbs do not differ from their perfective counterparts in lexical meaning but only in their aspectual value.

Imperative mood is expressed synthetically by morphologically distinct imperative inflections which are specified for the 2nd person singular or plural. In positive imperatives, both perfective (7) and imperfective verbs (8) are available.

- (7) Izpij_{2SG IMP PF} soka!
'Drink the juice!'
- (8) Pij_{2SG IMP IMPF} sok!
'Drink juice!'

In negative imperatives only imperfective verbs are allowed, either simple (9) or secondary imperfectivised (9b) forms. Negative imperatives with perfective verbs are ungrammatical under both prohibitive (10) and preventive (11) readings.

- (9) a. Ne pij_{2SG IMP SIMPLE IMPF} sok!
'Don't drink juice!'
- b. Ne izpivaj_{2SG IMP SECONDARY IMPF} soka!
'Don't drink up all the juice!'
- (10) * Ne izpij_{2SG IMP PF} soka!
'Don't drink up the juice!'
- (11) * Ne padni_{2SG IMP PF}!
'Don't fall down!'

A similar aspectual constraint holds to a different extent for the other Slavic languages which in general employ verbal aspect for the differentiation of prohibitive and preventive constructions. Consider the Russian perfective preventive imperative in (12) the equivalent of which has to be with an imperfective verb in Bulgarian (13).

(12) Ne upadi_{2SG IMP PF!} (Russian)
'Don't fall down!'

(13) Ne padaj_{2SG IMP IMPF!} (Bulgarian)
'Don't fall down!'

Traditional grammars state the ban on perfective negative imperatives as a grammatical rule without any explanation of the forces driving the absolute imperfectivity requirement. Georgiev's (1934) comparative diachronic study offers a politeness-based account, and later studies of verbal aspect in imperative constructions remain in the socio-cultural discourse (Andreičin 1978, Gerganov & Nikolov 1983, Mileva 1980, Pete 1978). One exception is found in Dakova (1994), who argues that in negative imperatives the aspectual opposition is neutralised as the negation of a process expressed by an imperfective verb entails the negation of its potential accomplishment expressed by the perfective counterpart. The fact that the other Slavic languages do not fully stick to that logic in that they employ both verbal aspects in negative imperatives shows that the proposed explanation needs further development.

Structural accounts treat Bulgarian negative imperatives as a difficult case and largely ignore the aspectual restriction (Rivero 1994, Han 2001, Tomić 2005, Zeijlstra 2004, but see Postma & van der Wurff's (2005:241f.) comment on the alleged defectiveness of the imperative paradigm in Bulgarian). If we follow one of the general lines of syntactic research on imperatives on the basic assumption that imperative structures do not feature a tense projection (Zanuttini 1997, Platzack & Rosengren 1998, Han 2001, Zeijlsta 2004), we are left with a puzzle if we consider that Bulgarian features proclitic verbal negation. It has been proposed that languages with preverbal negation do not have true synthetic negative imperatives because preverbal negation requires TP, and, in some approaches, builds with it a complex head as for instance ΣP in Laka (1994). In this approach we find a structural account of the way tense sustains the well-formedness of negative imperatives. Starting from this basic syntactic assumption, we explore its semantic underpinnings in Bulgarian by looking into the temporal construal of negative imperatives.

The semantic account of the ban on synthetic negative imperatives in some languages proposed by Han (2001) is at odds with the data found for Bulgarian, too. Han argues that languages lack true negative imperatives if the syntactic derivation leaves the imperative force

in the scope of negation. In such cases the structure is rendered ungrammatical by the mismatch between syntactic representation and intended interpretation. This approach predicts that negative imperatives should be ruled out in Bulgarian. Negation procliticises on the imperative verb, and therefore takes scope over the imperative feature. Han proposes that imperative force is checked at LF and points out that there must be additional, language-specific properties which motivate last resort morpho-syntactic operations. What are these independently motivated language-specific properties?

In the paper "Aspectual coercion in Bulgarian negative imperatives" (Kuehnast 2008), we build on the idea that the morpho-syntactic representation must match the intended interpretation and show that the availability of negative imperatives in Bulgarian and other Slavic languages depends on the language specific ability of verb forms to express tense. We offer an account of the well-formedness constraints on negative imperatives based on the interaction between imperative force, negation and aspect as factors which affect the temporal construal of the utterance. The aspectual restriction on the true negative imperatives in Bulgarian is motivated by the fact that only imperfective verbs express the temporal configuration of imperfective present, which results from the scope relations between obligation, negation and aspect in prohibitive sentences. The imperfectivity requirement naturally follows from the properties of the TAM system in Bulgarian, which features distinct morphological forms for each possible configuration of aspect and tense values. The emphasis on the imperfective pole of the aspect category becomes apparent through the regularity of imperfectivisation, through the present tense marking functions of imperfective morphology, and also through the preserved opposition of aorist and imperfect on the plane of the past tenses.

Based on the cognitive approach of time categorisation (Klein 1994), we explore the aspectual interpretation of negative imperatives and argue that in Bulgarian they present a case of morphologically overt aspectual coercion. Moens & Steedman (1988) define aspectual coercion as an aspectual type-shifting operation induced by a sentential modifier. Depending on the morpho-syntactic properties of a given language, the coercion takes place covertly or overtly by prompting specific morphological markers.

In Klein's approach, finiteness is synonymous with the expression of tense which signals that a speaker makes an assertion restricted to a time span which is located with respect to the time of speaking. This combination of truth assertion and a time stretch, called topic time, is also essential for the definition of aspect. Depending on the inclusion relations between the topic time and the time stretch of a situation, different aspectual values are yielded. Perfectivity results from the inclusion of the situation stretch in the topic time, which is perceived as an external perspective on the eventuality.

Imperatives do not feature topic time because a truth claim cannot be made about a situation whose realisation depends on the abilities of the addressee. Instead, they contain a reference time span constraining an obligation. The reference time in imperatives includes the time of speaking because the obligation is valid at the moment the request is uttered. The use of a perfective verb in a positive imperative emphasises the completeness of the requested situation because the resultant state is included in the time stretch of the imposed obligation.

In Bulgarian negative imperatives, the imperative force takes scope over negation, which itself scopes over the proposition influencing the aspectual value of predicate. Perfective verbs express a change from a source state to a resultant state, focusing the reference time on the resultant state. The presence of negation cancels the change of state, thus moving the obligation time back to the source state. The obligation time becomes included in the situation time of the eventuality, yielding an imperfective interpretation. In the imperatives under negation we obtain a combination of temporal values known as imperfective present: time of speaking and source state are included in the reference time of the obligation. This causes a mismatch between the aspectual interpretation of the imperative and the lexical or morphologically expressed perfectivity of the verb. This situation is resolved by the fully developed and productive mechanism of secondary imperfectivisation which derives an imperfective partner of each perfective verb.

The overt imperfective marking applies obligatory also in preventive utterances, for which other Slavic languages use perfective verbs. This phenomenon is rooted in the different functional range of perfective verbs. Preventive utterances contain a prediction and therefore their predicates acquire a future interpretation. In contrast to Bulgarian, Slavic languages use perfective verbs to express future, historic present tense and habituality. The TAM system in Bulgarian emphasises the imperfective side of the aspectual opposition reaching a state in which bare perfective verbs cannot express tense in the main clause. Bulgarian perfective verbs are fully integrated into the analytic future, where the temporal relation is expressed by means of a future auxiliary which freely combines with both verbal aspects. Historic present and habituality are predominantly in the domain of imperfectivised verbs.

The holistic meaning of Bulgarian perfectives prevents them from expressing present, as their reference time never includes the time of speaking. Only imperfectivised verbs establish such a relation to the time of speaking, while still indicating the potential boundedness of the situation. This specific event-internal point of view is achieved through the grammatical function of the imperfective suffixes. The functional transparency of the imperfective suffixes supports their spread within the temporal domain. In particular, the productive imperfective *-va* suffix is highly grammaticalised and has reached an inflectional status (Manova 2003). Due to the regular application of imperfectivisation, there are no perfectiva tantum in Bulgarian.

Considering these specific properties of the aspectual system in Bulgarian, the aspectual restriction in negative imperatives does not result from a defectiveness of the imperative paradigm. On the contrary, the functionally transparent imperfectivisation mechanism always yields an imperfective verb form which exactly maps the temporal interpretation of the negative imperative while preserving the lexical meaning of the perfective verb. Given these typological peculiarities, the existence of true negative imperatives and the motivation of their aspectual well-formedness restrictions are straightforward.

3. How do Bulgarian children acquire negative imperatives and what do these constructions reveal about the acquisition of verbal aspect?

The structural and semantic properties of negative imperatives, and in particular the morphological expression of the relevant aspectual construal, raise questions about the time course of their acquisition by children acquiring Bulgarian as a native language. The paper "Acquisition of negative imperatives in Bulgarian – implications for verbal aspect" (Kuehnast in press) presents an experimental study which investigates how Bulgarian pre-school children combine elements of modality, negation and verbal aspect in order to arrive at the target use of negative imperatives.

For children, the proper use of negative imperatives is not a trivial task because it requires the representation of an abstract, counterfactual situation model. It involves at least a basic conceptualisation of causality relations, long known to be central to the acquisition of negation (Volterra & Antinucci 1979, Bates et al. 1979). In order to utter a pragmatically appropriate negative command, the child needs to draw inferences about the potential behaviour of the addressee and to reason that the probable concatenation of addressee's activities will result in an undesirable state of affairs. The establishment of a causal relation between the current and potential states of affairs influences the way children depict the internal structure of the situation and its temporal location when uttering a negative imperative. At the linguistic level, children acquiring Bulgarian have to mark overtly the perspective they take towards the represented situation by means of aspectual morphology. Bulgarian negative imperatives represent a context of overt aspectual coercion and therefore provide a suitable linguistic basis for a production study targeting the processing of aspectual markers. The imperfectivisation success and characteristics of the produced verb forms also allow inferences about the way children interpret negation in imperative sentences.

The study focuses on the acquisition of forms and functions of imperfective morphology at the level of verbal aspect. From a morphological point of view, aspectual derivation is best represented through the pattern of aspectual triplets. Applied to a morphologically simple imperfective verb (*pija* 'drink'), perfective affixes (18 prefixes and one suffix) yield perfective

verbs which may or may not differ in lexical meaning from the imperfective verb (*izpija*_{PF} 'drink up'; *pijna*_{PF} 'drink a small quantity'). The derived perfective verbs may be rendered imperfective again by means of an imperfective suffix which attaches to the perfective stem (*izpija*_{PF} - *izpivam*_{IMPF} 'be drinking up'). In this case, the derived imperfective verb represents an aspectual form, as the imperfective suffix preserves the lexical meaning and the syntactic properties of the perfective verb. Imperfective morphology is used with simple perfective verbs and with derived perfective verbs. In the latter case this mechanism is called secondary imperfectivisation. There are two unevenly distributed imperfective suffixes. The non-productive *-a* suffix, mostly in combination with stem changes (*skoča*_{PF} - *skačam*_{IMPF} 'spring'), constitutes a minor imperfectivisation pattern. The *-va* suffix represents a highly productive pattern with a transparent form to function relation. Evaluated against such factors as preservation of word class, productivity, and consistent assignment of inflexion class, the main imperfectivisation device in Bulgarian, the *-va* suffix has acquired the status of aspectual inflection.

The study traces developmental differences children display in their preferred imperfectivisation techniques in relation to the three basic types of perfective verbs – simple, prefixed and suffixed perfectives. We argue that appropriate, adult-like application of secondary imperfectivisation reflects the ability to establish an internal viewpoint to telic eventualities. Examining different types of situation descriptions depicted in the perfective derivation patterns, we show that the acquisition of secondary imperfectivisation correlates with the growing capability for finer perspective adjustments such as an imperfective view point towards a two-state accomplishment situation description. The production of secondary imperfective forms is seen as an indicator of the scope relations children represent between negation, mood and aspect.

3.1. Method

We conducted a production study with a cross-sectional design using an elicitation task. A total of 40 monolingual, normally developing children participated in the experiment. They were divided into 2 age groups – 3-year-olds (mean age 3;4, age range 2;11-3;11) and 4-year-olds (mean age 4;5, age range 4;0-5;0).

The children performed an elicitation task in a communicative situation with two participants. The child is introduced to a penguin puppet (played by the first experimenter) who is not acquainted with the rules and the proper behaviour in a kindergarten. The second experimenter produces positive synthetic imperative utterances, asking the penguin to carry out different actions. The child is encouraged to prevent the penguin from obeying the requests by producing negative imperatives (14).

(*skoča*_{PF} -* *skočyam*_{IMPF} instead of *skačam*_{IMPF} 'spring'). The second strategy, prefix stripping (Taft 1981), removes the prefix from the perfective verb stem returning the simple imperfective verb (*nadraskam*_{PF} – *draskam*_{IMPF} instead of *nadraskyam*_{IMPF} 'to be scribbling sth. over'). From a processing point of view, these imperfectivising techniques represent two different mechanisms. Prefix stripping decomposes the complex perfective stem and picks up the lexically imperfective verb root. Overgeneralisation of *-va* results from the application of an inflection rule. Prefix stripping corresponds to a more general morphemic parsing mechanism which decomposes complex stems into root and affixes. In the case of suffixed perfective verbs, stripping the perfective *-n* suffix reliably yields the simple imperfective verb (*ritna*_{PF} – *ritam*_{IMPF} 'kick'). The representation of verbal morphological structures becomes more stable with age, which sustains prefix stripping as an imperfectivisation strategy. The usage frequency of the *-va* marker also increases and the competition between the two mechanisms results in the production of hybrid forms. While the strengthening of rule-based imperfectivisation seems to boost the production of target imperfective forms from simple perfective verbs, it does not produce the same effects for the prefixed perfectives. The production of target secondary imperfective forms of prefixed perfective verbs remains hindered in both age groups being only slightly above chance level.

The form-based analysis implicates that the obtained results cannot be explained by morphological complexity and associated lexical retrieval routes only. As suggested in the literature (Burani et al. 2008), processing of morphologically complex words also depends on the semantic integration of roots and affixes. The basic inference from the form-related analysis is that the observed imperfectivisation behaviour reflects not only morphological parsing effects based on the formal properties of aspectual morphemes but also the semantic integration based on semantic compatibility between perfective and imperfective affixes. Secondary imperfectivised verbs achieve the highest level of derivational complexity as they contain perfective and imperfective morphemes, thus involving a certain antagonism between the expressed aspectual values. The complex derivation reflects an intricate aspectual construal involving an internal perspective to a potentially bound two-state situation description.

The differences we detected in the way children imperfectivise the perfective prompts are closely connected to the representation of the situation model in negative imperatives. The production pattern shows that children perform best with suffixed and simple perfective verbs which denote punctual and semelfactive achievements. Their imperfective aspectual partners denote simple activities. In a negative imperative, negation applies to the associated activity represented either by means of lexically imperfective verbs or by verbs carrying only imperfective markers. Rejecting the potential atelic activity children prevent causally related changes in the state of affairs. In the case of prefixed perfective verbs depicting

accomplishments, the basic activity is situated at the source stretch of a corresponding 2-state perfective predicate. Children in both age groups regularly produced negative commands in which the predicate is imperfectivised by prefix stripping. In this way, they apply negation to an atelic situation description depicted by the simple imperfective verb. A negative imperative containing a simple imperfective verb imposes on the addressee the requirement to refrain from an activity which is the source of the denied situation. In terms of pragmatic appropriateness, such negative requests reliably provide the desired result because, without a source action, no resultant change of state can be obtained. At this point, the difference between adult and child representation of negative imperatives becomes obvious. The target form of a negative imperative depicting an accomplishment requires an imperfectivised prefixed verb. Secondary imperfectivisation preserves the type of situation description and only shifts the perspective from the target state to the source state. Obligation time becomes included in the source state of the accomplishment. The resulting interpretation is that the speaker does not request the listener to refrain from the atelic activity; only the attainment of the prospective change of state is rejected.

The meaning-related interpretation of the imperfectivising strategies shows that children have difficulties to apply a progressive viewpoint to an accomplishment situation description. Instead, both age groups still tend to generalize on simple causality entailment - rejecting a potential activity maintains the current state of affairs. Therefore, the rate of prefix stripping applied to accomplishment predicates remains stable within the investigated age bracket (2;11 – 5;0). With age children apply the productive imperfective suffix more often in an attempt to produce the required secondary imperfectivised form. The increase in the production of target and erroneous secondary imperfective verbs reflects the steps children take towards an adult representation of the effect negation exerts on aspectual construal.

This experimental study on the acquisition of negative imperatives in Bulgarian yielded results which allow inferences about age-related changes of children's ability to look at the internal structure of eventualities and to mark the perspective they take using language-specific means. While children successfully master different facets of deontic modality employing various syntactic constructions, they still show some deviation from adult speakers with respect to the representation and overt marking of an inner perspective to a telic situation induced through the presence of negation.

4. Normal and aphasic comprehension of negative imperatives

The structural properties of negative imperatives in Bulgarian provide an opportunity to obtain online data against which the predictions of two theoretical approaches to the underlying deficit in Broca's aphasia could be tested. Theories proposing a disturbance of syntactic

knowledge in terms of reduced syntactic representation would predict poor performance of agrammatic speakers in tasks involving the processing of negative imperative sentences (Grodzinsky 2000, Friedman & Shapiro 2003). Comprehension of negative imperatives requires the projection of a clausal structure involving the CP layer for force-checking purposes. Additionally, the representation of negative imperatives becomes more intricate through the clitic status and focussing functions of negation which attracts the pronominal clitics from their post-verbal positions and forms with them a clitic cluster. Resource-limitation approaches propose that the syntactic knowledge and structure-building abilities of agrammatic aphasics are preserved but that lesions to Broca's region lead to a slowed-down implementation of syntactic operations and consequently to timing-based interpretation difficulties (Burkhardt et al. 2008, Caplan et al. 2007, Haarman & Kolk 1994, Pinãngo 2002 and Rispens et.al 2001 inter alia). From this perspective, the relatively preserved knowledge about the syntactic properties of negation should lead to a protracted but successful processing of negative imperatives.

Employing a self-paced reading task, we aimed at a closer approximation of the way the syntactic structure is derived during the course of online comprehension of negative imperatives in two tasks. The first task tests sensitivity to the aspectual restrictions which the presence of negation imposes on the morphological realisation of the verb. The second task examines the phono-syntactic constraints on the position of clitic pronouns under negation. Although significantly slowed-down, the behavioural reaction time data obtained from the aphasic group present evidence that the agrammatic participants performed similarly to the normal group when parsing the syntactic structure in both tasks. The obtained results also revealed some differences from normal processing in terms of the general understanding of negative imperatives reflected in the agrammatics' responses to comprehension questions. We interpret the obtained pattern as indicative of difficulties the agrammatic individuals experience with lexical integration and subsequent interpretation of the obtained syntactic structure.

4.1. Normal and agrammatic comprehension of overt aspectual coercion in negative imperatives

Cross-linguistic research on negation in agrammatic aphasia has yielded results which diverge for production and comprehension. It also shows that agrammatic performance depends on the typological properties of the investigated languages (Bastiaanse et al. 2002, Fyndanis et al. 2006, Rispens et al. 2001, Stavrakaki & Kouvava 2003). In comprehension tasks, English and Spanish, Dutch, and Norwegian agrammatics exhibited no differences between negative and affirmative sentences, both sentence types being relatively well preserved. In production-

related tasks, English and Spanish agrammatics had considerable difficulties constructing negative sentences, while Dutch and Norwegian patients performed well. Greek patients also showed a comparable behaviour, an overall deficit in the production of negative elements marking sentential negation, but relatively unaffected comprehension. The authors of the cited studies interpret the cross-linguistic variability in terms of typological differences in the internal structure of negation as functional projection, which allows or blocks verb movement. If a non-clitic negative marker occupies the head of the functional projection, it blocks the movement of the verb to higher functional projections. Consequently, English agrammatics face problems with negation, as its realisation as a head blocks verb movement and necessitates *do*-insertion. In Bulgarian, the negative marker *ne* occupies the head position in the functional projection, but given its clitic status it is not expected to hinder agrammatic production. Nevertheless, non-fluent Bulgarian-speaking aphasics rarely produce sentential negation, the few examples found in free speech samples being automatisms.

The asymmetry between production and comprehension and the cross-linguistic differences promote the hypothesis that impaired performance with sentential negation may be also contingent on reduced abilities to establish a proper structural relation between negation and tense as functional categories. This assumption is supported by the consistent strategic variation employed by the agrammatics across the investigated languages, namely substitution of sentential for constituent negation. In the case of constituent negation, there is no need to establish a syntactic dependency between negation and tense and to represent the resulting semantic scope relation.

In the paper "Processing negation and aspect in Bulgarian - Evidence from normal and agrammatic sentence comprehension" (Kuehnast 2003) we investigate the abilities of Bulgarian Broca's aphasics to comprehend sentential negation in imperative clauses. Successful comprehension of negative imperatives involves verb movement for force-checking purposes and the establishment of proper syntactic dependencies between negation, mood and aspect as functional categories. These syntactic operations are reflected overtly in the position and the morphological form of the predicate, which in Bulgarian hosts the proclitic negation marker and must be marked for the imperfective aspect.

In order to examine the fast and automatic structure-building processes triggered by the presence of negation in an imperative clause we conducted an on-line, self-paced reading task. We targeted the processing of aspectually appropriate and inappropriate predicates in the local syntactic dependency between negation and the verb. In contrast to studies of isolated words which provide evidence about the representation of morphological structure in the mental lexicon, an online comprehension study at the sentence level allows for a closer approximation of the syntactic functions of bound morphemes in the verbal predicate.

The design of the reaction-time study draws on the central assumption that sensitivity to the morphological well-formedness of the predicate is based on the proper representation of negation and aspect in the syntactic structure, which sustains the temporal construal of the imperative sentence. The syntactically motivated scope relation between negation and aspect increases the structural predictability during sentence comprehension. Lexical access and the integration of imperfective verb forms are expected to proceed faster in negative than in positive imperatives. Sensitivity to the morpho-syntactic violation of the aspectual restriction in negative imperatives with perfective verbs is supposed to elicit longer reading times as compared to the reading times of perfective verbs in grammatical positive imperatives. Encountering an aspectually inappropriate verb also increases the processing load due to the accommodation processes it triggers during sentence comprehension.

Additionally, the method allows a closer look at the impact of morphological complexity on the processing of aspectually marked verbs. Research on the representation and processing of aspectual morphology in single words (Slabakova 2001, Nikolova & Jarema 2002) has shown that Bulgarian native speakers are highly sensitive to the constituent structure of morphologically complex words. Both studies present evidence that the semantic transparency of perfective derivation facilitates lexical access. Perfective prefixes are represented in the mental lexicon and exhibit a default interpretation which besides the lexical component always includes telicity as a constant grammatical component. Embedded in a syntactic structure which requires an overt imperfectivity marking, verbs with perfective prefixes are expected to increase the processing load due to the semantic opposition between perfective and imperfective aspectual affixes.

4.1.1. Method

Nine individuals diagnosed with Broca's aphasia after a cerebrovascular accident (CVA) in the left hemisphere (mean age 48,7) and 35 unimpaired controls matching in age and education participated in the study. All participants are native monolingual speakers of Bulgarian. The aphasic participants were moderately to severely impaired according to their scores in the Bulgarian version of the Boston Diagnostic Aphasia Examination (Alexandrova et al. 1996) and clinical consensus.

In order to investigate the syntactic and morphological effects of negation on the processing of negative imperatives as contexts of overt aspectual coercion, we employ a self-paced reading task with a stationary window. The reading latencies (from onset of the word presentation on the screen until button press) depend on the properties of the words being read and correlate with the time course of the cognitive processes during reading and text comprehension. The basic assumption of the self-paced reading paradigm is that longer reading

times reflect higher processing costs while shorter reading times reflect a lower processing effort (Just et al. 1982).

We focus on the impact of the following factors: presence of negation (positive and negative sentences), verbal aspect (perfective and imperfective) and perfective derivation (simple and prefixed) on the processing load of imperative predicates as reflected in the reading latencies of the verbs. As stimuli we use simple and prefixed perfective verbs, the latter derived from the former (*sipja* PF – *presipja* PF 'pour into - pour from sth. into sth.'). The imperfective verbs were derived from the simple and prefixed perfectives by means of regular imperfectivisation, thus forming aspectual pairs with identical lexical meaning (*sipja* PF – *sipvam* IMPF; *presipja* PF - *presipvam* IMPF). The verbs of each aspectual pair were inserted in positive and negative imperative sentences. The resulting positive imperatives are grammatical with perfective and imperfective verbs (15)-(16). The negative imperatives are ungrammatical with perfective verbs (17) and grammatical with imperfectivised verb forms (18).

- (15) a. Molja te, sipi PF vodata v legena!
'Please, pour the water into the washbowl!'
- b. Molja te, presipi PF vodata ot legena!
'Please, pour the water from the washbowl into something else!'
- (16) a. Molja te, sipvaj IMPF / sipvaj IMPF olioto v tigana!
'Please, pour the oil into the pan!'
- b. Molja te, presipvaj IMPF olioto ot tigana!
'Please, pour the oil from the pan (into something else)!'
- (17) a. * Molja te, ne sipi PF supata v kupata!
'Please, don't pour the soup into the bowl!'
- b. * Molja te, ne presipi PF supata ot kupata!
'Please, don't pour the soup from the bowl (into something else)!'
- (18) a. Molja te, ne sipvaj IMPF mljakoto v šišeto!
'Please, don't pour the milk into the bottle!'
- b. Molja te, ne presipvaj IMPF mljakoto v šišeto!
'Please, don't pour the milk from the bottle (into something else)!'

The stimuli sentences were used in a word-by-word, self-paced reading task. Reading latencies for each word were automatically recorded.

A comprehension yes/no question was inserted after every third sentence. The questions posed were positive (19a) or negative (19b) and tested the interpretation of the stimuli sentences. The positive and the negative questions were evenly distributed over the four conditions.

- (19) Request: Molja te, ne sipvaj _{IMPF} mljakoto v šišeto!
'Please, don't pour the milk into the bottle!'
- a. Positive question: Da go sipja li v šišeto?
'Should I pour it into the bottle?'
- Answer: No!
- b. Negative question: Da ne go li sipvam li v šišeto?
'I should not pour it into the bottle?'
- Answer: Yes!

The statistical analyses (ANOVA, repeated measures) are based on the mean reading times elicited by the verbs and on the scores of correct answers to the comprehension questions.

4.1.2. Results and discussion

The results obtained from the neurologically unimpaired persons confirmed our basic assumptions about the processing of negative imperatives as instantiation of overt aspectual coercion (see Fig. 1). In negative imperatives, imperfective verbs were processed significantly faster than their ungrammatical perfective counterparts which holds for both verb types. The presence of negation increases structural predictability, thus speeding up lexical access to imperfective verbs. The same forms elicit the longest reading times in positive imperatives, where no structural or contextual motivation supports the use of imperfectivised verbs, perfective verbs being the default form.

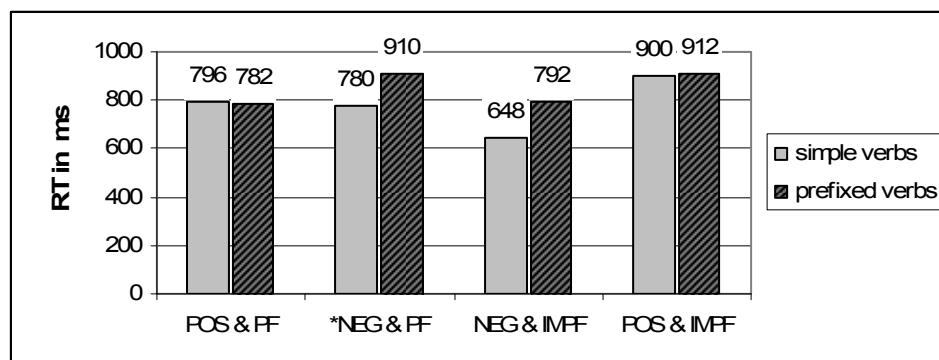


Figure 1. Control group: RT (ms) to the verb per condition

The grammatical function of aspectual affixes was revealed in contexts in which they interact with other aspectually sensitive functional elements. Compared to simple verbs, prefixed verbs elicited longer reaction time only in negative imperatives. There, they increase the processing load of the verb due to the semantic incompatibility between them as perfectivity markers and the imperfective aspectual construal imposed by the presence of negation. In positive sentences no processing differences between simple and prefixed verbs were found. This processing pattern mirrors the findings of other studies investigating the morphological representation of Bulgarian verbs. The absence of a processing cost for prefixes during lexical access to prefixed verbs is explained by the derivational transparency of Bulgarian verbs which facilitates lexical decomposition (Nikolova & Jarema 2002, Slabakova 2001). The grammatical function of imperfective suffixes as aspectual inflection is manifested in the context of aspectual coercion. After negation, imperfectivised imperative verbs elicited the fastest reading latencies. In positive imperatives, imperfective suffixes increase the semantic incompatibility between the aspectual values of the constituent morphemes producing a complex iterative interpretation. The increase of semantic complexity is reflected in the longest reading latencies elicited by the control group.

Notwithstanding the generally slow reading speed, the processing data of these Broca's aphasics reveal a pattern which is not significantly different from the normal processing pattern (see Fig. 2). The agrammatic participants react to the ungrammatical perfective verbs in negative imperatives with increased reading effort in contrast to the relative ease with which they read the longer imperfective verbs in those sentences. The obtained significant difference holds for simple and prefixed verbs. This finding is taken as evidence that Bulgarian agrammatics are able to detect the tested morpho-syntactic violation due to their preserved ability to parse the structural dependency between negation and aspect. They also take advantage of the effect of negation on the aspectual value of the predicate, which speeds up the lexical access to an imperfective verb form.

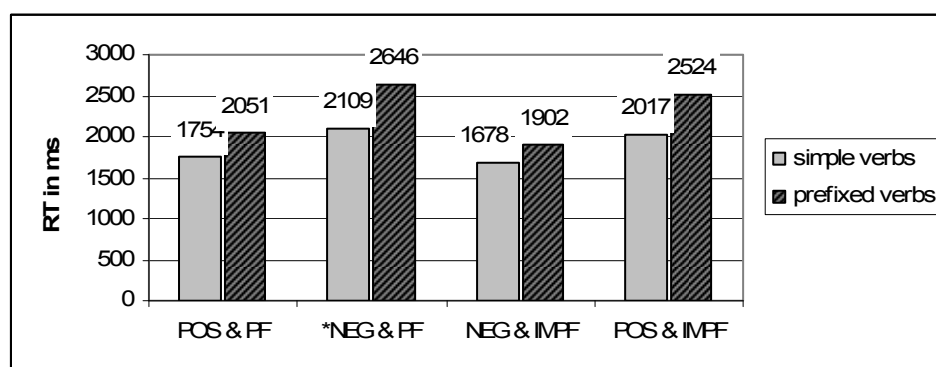


Figure 2. Aphasic group: RT (ms) to the verb per condition

The reaction time data obtained from the prefixed verbs reveal that the neurologically unimpaired group and the aphasic group accessed those verbs differently. The controls elicited longer reaction times for prefixed verbs only in negative sentences. For the agrammatics, the presence of a prefix always induced longer reading times as compared to the reading times of simple verbs. This result suggests that for the investigated Bulgarian agrammatics, morphological decomposition does not function as a fast and effective route of lexical access, although it is still available to them. The proposed interpretation is supported by the findings of Nikolova and Jarema (2004), who investigated the on-line recognition of single prefixed verbs in a non-fluent Bulgarian-speaking aphasic patient and concluded that the patient had a problem at the level of decomposition-based mechanisms.

So far, we interpret the obtained on-line processing data as indicative of a slowed-down but preserved ability to parse the structural dependency between mood, negation and aspect as morphologically expressed functional categories and to exploit their semantic features in contexts of aspectual coercion.

The rates of correct answers achieved by the aphasic and the control group are analysed in order to further explore the hypothesis that the agrammatic behaviour is associated with slow implementation of syntactic operations which causes a temporal delay in the incremental integration of the accessed lexical items thus hindering interpretation processes. The analysis of the correct answer scores achieved by the normal and aphasic subjects in the on-line comprehension test show that both groups had difficulties to answer questions posed to ill-formed negative imperative sentences. However, there is a significant difference in the ability to assign meaning to such sentences. For normal subjects, interpretation of aspectually ill-formed negative requests is not really problematic, while the correct answers of the aphasic subjects do not rise beyond chance level. This result reveals that the aphasic patients were not able to assign meaning to the negative imperatives containing a morpho-syntactic violation and therefore gave random responses. In contrast, the aphasic participants achieved correct answer scores well above chance level when answering positive questions to grammatical negative imperatives and to grammatical positive imperatives, as well. Responding to questions containing negation turned out to be difficult for both groups, but again only the aphasic participants performed at chance level.

Non-fluent Bulgarian aphasics are able to parse the structural relation between negation and aspect arriving at the appropriate imperfective aspectual construal which facilitates lexical access to imperfective verbs. Their restricted processing resources, however, do not always suffice to construct and maintain an integrated semantic representation. The ability to answer comprehension questions during an on-line task depends on sufficient processing speed and working memory span. A proper response presupposes a comparison between the semantic

representations of the imperative and of the question, which need to be stored together in the working memory. Factors such as grammaticality violations or the higher syntactic and semantic complexity of negative questions increase the processing load and cause temporal mismatches which eventually disrupt comprehension.

4.2. Normal and agrammatic comprehension of clitic clusters in negative imperatives

The presence of negation as a functional head has a significant impact not only on the derivation of syntactic structure and on the aspectual interpretation of the utterance, but due to its clitic status also on the prosodic properties of negative utterances in Bulgarian. In case of narrow scope constituent negation, the negative marker *ne* is a free standing word, bears stress and selects long pronominal forms (20). In case of wide scope sentential negation, the unstressed negative marker behaves as a verbal proclitic and combines only with short pronominal forms (21). In Bulgarian, short pronominal forms are verbal clitics which regularly appear after the verb if sentence initially there is no lexical material to support them.

(20) *Né nego* LONG 3SG ACC MASC/NEUTR *viždam*, *a néja* LONG 3SG ACC FEM
'I see her not him.'

(21) *Ne gó* CL 3SG ACC MASC/NEUTR *viždam* 1SG PRES.
'I don't see him/it.'

In the paper "Processing clitic pronouns in Bulgarian – evidence from normal and agrammatic comprehension" (Kuehnast 2009) we investigate the processing of direct object pronominal clitics under negation, which regularly build together a clitic cluster. The proclitic negation attracts the enclitic short pronoun and they form a prosodic unit by mutually satisfying their prosodic requirements. The resulting cluster attaches itself to the verb, barring other lexical material from intervening between them. The clitic cluster exhibits a rigid word order, according to which the direct object clitic occupies the right edge thus being directly adjacent to the verb. Negation passes its inherent stress to the next clitic gluing together all clitics into a phonological word stressed on the second syllable.

The clitic placement in Bulgarian is best understood in terms of non-trivial chain formation. Under this approach, syntactic movement of the verb and of the clitic elements creates a chain of copies, not of traces (Chomsky 1993). This is a relevant difference as in a chain of traces, only the head of the chain is supposed to be the location of the phonological form. No such restriction applies to a non-trivial chain of copies. The overt realisation of copies is regulated by the same principle unless the pronunciation of the head copy would result in a violation of phonological requirements.

In Bulgarian, copy movement places a pronominal clitic in front of the verb while leaving a lower copy in a post-verbal position. In case no lexical material is located in front of the clitic, the head of the non-trivial chain is left unsupported, which produces an ill-formed construction. Pronunciation of the next lower copy satisfies the enclitisation requirement of pronominal clitics allowing for the enclitic element to be hosted by the verb.

Online experimental data on the processing of sentences involving clitic clusters may deepen our understanding on the nature of the phonology-syntax interface. The comparison of normal processing data with language breakdown data from agrammatic aphasics yields valuable insights in two respects. First, under the assumption that agrammatism is due not to a general syntactic deficit, but to a slowed-down implementation of syntactic operations, we approach questions concerning the tacit knowledge of clitic properties aphasic individuals may have preserved. We further explore the hypothesis that temporal mismatches resulting from the slow structure building affect the proper semantic representation. The increase in semantic complexity has been shown to affect the comprehension of seemingly simple structures like imperative sentences. In imperatives, the proclitic nature of negation aids the parsing of the syntactic structure but at the same time it increases the interpretation effort.

Due to their status as unaccented functional elements, pronominal clitics are often absent in agrammatic speech (for cross-linguistic evidence see Rossi 2007, Stavrakaki & Kouvava 2003, Menn & Obler 1990, *inter alia*). With respect to the sensitivity to stress and prosodic information, some studies have presented evidence that brain damage in the left hemisphere causes a general prosodic deficit which for sentence comprehension is manifested in difficulties in utilising linguistic prosodic cues (Baum et al. 1982, Burchert et al. 2005, Cappa et al. 1997, Pell & Baum 1997). The study of Avrutin et al. (1999) on the impact of contrastive stress on the interpretation of English pronouns reveals that to a certain extent the agrammatics were able to employ stress as a reference determiner. The authors conclude that Broca's aphasics may not be able to implement this prosodic cue to a full extent during a discourse-based reference establishment. They reason that the complexity of the applied task may attenuate the effect of prosody and advocate tasks which target stress-induced morpho-syntactic operations and thus avoid discourse processing.

The present self-paced reading study circumvents discourse-related interpretation efforts. It examines the impact of the phono-syntactic properties of negation on clitic cluster formation by targeting sensitivity to position violations during reading. Additionally, the experiment seeks to contribute to the discussion revolving around differences in the comprehension of personal and reflexive pronouns. We explore the hypothesis that the processing load of reflexive and personal pronominal clitics may vary with respect to different phono-syntactic environments and with respect to the availability of potential referents.

In a cluster containing negation and a direct object clitic, two different pronominal types may appear: a personal pronoun and a reflexive pronoun. They are subject to the same phonosyntactic restrictions and occupy the same direct object position. Nevertheless they exhibit quite a different referential behaviour. Reflexive pronouns and, more specifically, direct object reflexive clitics establish a co-reference relation to the sentential subject based on syntactic principles. In contrast, pronominal direct object clitics do not refer to the sentential subject. The interpretation of a reflexive pronoun is determined by binding principles while the interpretation of a personal object clitic depends on the contextual availability of referents which may or may not be provided in the same sentence. Thus interpretation of pronouns depends on the establishment of a discourse model and the search for appropriate referents in it. The close association of the clitics with the verb and the precise analysis of the clitic doubling phenomenon have led to the conclusion that in Bulgarian, pronominal clitics are best understood as syntactic object agreement markers (Franks & Rudin 2005, Stanchev 2007).

4.2.1. Method

Nine individuals diagnosed with Broca's aphasia (mean age 49,7) after a CVA in the left hemisphere and a group of age and education matched healthy controls participated in this experiment. The aphasic participants were moderately to severely impaired and were at least 4 months after onset at the time of testing. Transcriptions of free conversation samples and retelling of the Little Red Riding Hood story reveal that they rarely produce pronominal clitics and even fewer clitic clusters.

To evaluate the processing of pronominal clitics in clitic clusters and to assess participants' knowledge of phono-syntactic constraints on clitic placement under negation, a self-paced reading task was employed. We used a stationary window method for a word-by-word presentation of positive and negative imperative sentences with reflexive and personal direct object clitics. The contrast between these pronoun types provides for a better distinction between the relative weight of processes induced by the syntactic and by the referential properties of clitic pronouns in the course of sentence comprehension.

We used 3 types of short imperative sentences to test sensitivity to violations of the well-formedness restrictions on clitic placement under negation. The first type included well-formed sentences in which the proclitic negative particle *ne* and the pronominal enclitic form a clitic cluster (22). In the clitic cluster, the direct object clitics appear pre-verbally and receive stress. The second sentence type features ungrammatical negative imperatives (23). The ill-formedness results from the post-verbal realisation of the pronoun, as an enclitic. The third sentence type presents well-formed positive imperative sentences in which the pronoun is realised in a post-verbal position (24).

- (22) Molja te, ne go PERS 3SG MASC/NEUTR ACC / se REFL ACC krij otzad!
'Please, don't hide it behind! / Don't hide behind!'
- (23) Molja te, ne krij *gi PERS 3PL ACC / *se REFL ACC sega!
'Please, don't hide them now! / Don't hide now!'
- (24) Molja te, krij go PERS 3SG MASC/NEUTR ACC / se REFL ACC bärzo!
'Please, hide it/him fast! / Hide fast!'

Half of the stimuli sentences contained personal pronouns and half reflexive pronouns. In this study, the participants can determine the referent of the pronominal clitics only when reflexive pronouns are used. Without contextually available referents, the personal pronouns only function as object agreement markers in the present stimuli.

The clitic pronoun and the word following the pronoun are taken to constitute the critical processing region in the experimental stimuli. The response latencies measured at these two points are supposed to reflect processing effects relevant for the present research questions.

Based on the theoretical considerations discussed above, the following predictions can be made about the pattern of normal processing in the investigated sentence types. Firstly, we expect that the response latencies obtained for the critical region of the well-formed negative sentences will be the shortest. In these sentences the prosodic requirements of the proclitic negation and of the enclitic pronoun are mutually satisfied through cluster formation. The convergence of prosodic and syntactic cues increases structure predictability and speeds up lexical access to the verb.

Secondly, with respect to the overt realisation of a lower copy in the ill-formed negative sentences we expect that the split of the clitic cluster will elicit slowed-down RT to the displaced pronoun and to the next word as a reflection of accommodation and recovery processes. Thirdly, we expect a 'cluster bonus' in the processing of pronouns and verbs in the well-formed negative imperatives as compared to the processing of pronouns and adverbs in positive imperatives. The positive imperatives represent a construction type in which the mismatch between the enclitisation requirement of the pronoun and the syntactic derivation results in the overt realisation of a lower copy. The transitive verb appears sentence-initially which given the free word order in Bulgarian does not aid structural expectations towards a direct object at the clitic position.

For agrammatic processing, our predictions are guided by the assumption that the aphasic patients exhibit a deficit in processing prosodic information and a slowed-down implementation of syntactic operations. Therefore we predict that the pronouns will elicit similar reaction times in all sentence types as the realisation of a lower copy does not represent a syntactic violation. However, if the aphasic individuals are sensitive to the prosodic

constraints negation imposes on the position of pronominal clitics, but suffer from a timing deficit in the implementation of their prosodic knowledge we expect to find in the critical region a RT pattern similar to that of the control group.

4.2.2. Results and discussion

The reaction time data obtained at the two critical points, the pronoun and the word next to it, show that the predictions about normal processing are borne out (see Fig. 3). The control group process clitic pronouns in the clitic cluster faster than those in a post-verbal position. No reaction time difference was found between the pronouns in enclitic position despite the well-formedness contrast of the positive and the negative imperatives containing them. The effect of the positional violation was revealed in the reading latencies of the words immediately following the pronominal clitics. The slowing down of the response latency after erroneously placed pronouns is indicative of the spill-over effect induced by the increase of processing load through the word order violation. As predicted, the verbs following the clitic cluster elicit the shortest reading times due to their high structural predictability.

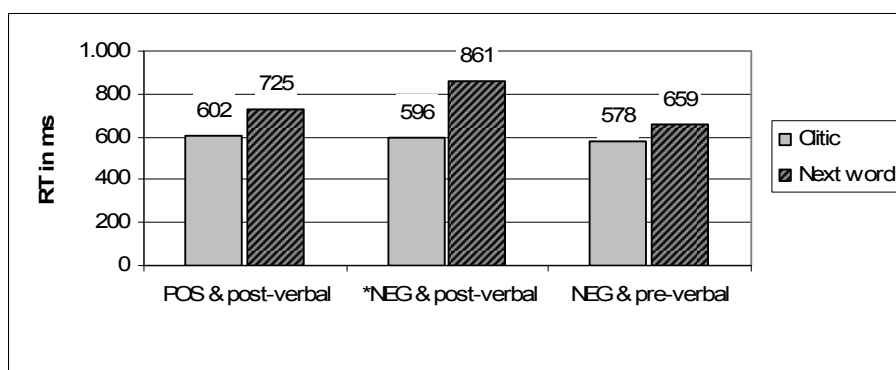


Figure 3. Control group: RTs to the clitic and the next word per condition

With respect to the aphasic comprehension data, we observe that the response latencies elicited by the pronominal clitics do not differ significantly in the three sentence types, although the pronouns elicited the slowest RT in the ill-formed negative imperatives (see Fig.4).

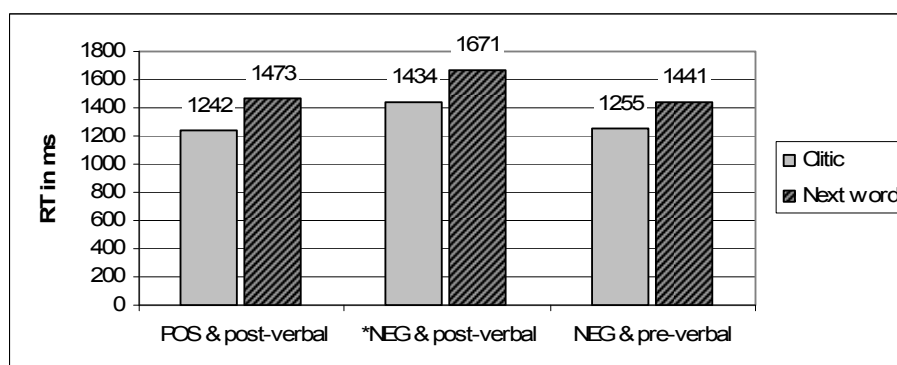


Figure 4. Aphasic group: RTs to the clitic and the next word per condition

The aphasic group seems not to profit from the convergence of prosodic and syntactic cues expected to facilitate the integration of the pronouns in the clitic cluster as compared to the low structural predictability of the enclitic pronouns in the positive sentences.

In a sense, all employed sentence types (including the ill-formed one) satisfy the enclitisation requirement of the pronominal clitics, but not all satisfy the cluster formation requirement of the negative clitic. The obtained pattern may be interpreted as evidence that the aphasic speakers do not react to the phono-syntactic properties of the negation marker. The reaction time data obtained at the next word, however, shows that the above interpretation cannot be fully supported. The adverbs in the ill-formed negative sentences yielded the longest reading times, which we interpret as a spill over effect due to increased processing effort. The obtained pattern mirrors the result from regular processing but the relevant reaction time differences appear only at the second word in the critical region. This finding indicates that the aphasic participants successfully detected the word order violation. The reading latencies obtained for the word following the clitics support the view that the phono-syntactic requirement of cluster building under negation is still operative in agrammatic comprehension, although in a protracted manner.

The second aim of the paper was to explore differences in the processing of personal and direct object clitics in imperative sentences when no explicit reference assignment is required. In the present experiment only reflexive pronouns establish a co-reference relation to the virtual addressee of the request by means of syntactic binding. Personal pronouns are prevented from establishing a co-reference relation to the sentential subject on structural grounds and from establishing a co-reference relation to a discourse referent by the lack of contextually available referents. Under these circumstances, the personal pronouns have to be parsed as pure direct object agreement markers.

The control group and the aphasic group show a significant effect of pronoun type on the response latencies of the clitic pronouns. The reflexive clitics elicit slower RT than the personal direct object clitics in all conditions. Having in mind that syntactically both pronoun types occupy the same position and that the same pattern is obtained in all three sentence types, we can safely conclude that the longer response latencies of the reflexive clitics are associated with an interpretation process which does not take place for the personal clitics. This finding presents new evidence in the scientific discourse concerning different comprehension patterns for reflexive and personal pronouns in agrammatic aphasia and which concerns the assumed sources of such differences: impaired knowledge of syntactic principles and operations or implementation difficulties when a discourse representation has to supplement the syntactic representation for reference establishment. On the one hand, some studies report that agrammatic aphasics exhibit more difficulties in comprehending personal than reflexive

pronouns in off-line tests (Baauw and Guetos 2003, Grodzinsky et al. 1993, Ruigendijk et al. 2006). On the other hand, we also find cross-linguistic evidence that aphasic individuals do not experience more difficulties in comprehending personal than reflexive pronouns (Edwards & Varlokosta 2007, Martínez-Ferreiro 2009, Vasić 2006).

The results of the present study support the hypothesis that the obtained pattern of clitic processing is based on a slowed-down implementation of narrow syntax knowledge in Bulgarian Broca's aphasics which affects the utilisation of prosodic information. The protracted structure building consumes processing resources and causes temporal mismatches with other processes sustaining sentence comprehension. The syntactically triggered interpretation process increased the processing load of reflexive clitics in the normal and in the agrammatic group. Similarly to the unimpaired speakers, the agrammatic group parsed personal pronouns as syntactic object agreement markers with greater ease, which is also reflected in the faster integration of the words following personal pronouns in well-formed imperative sentences. The experimental findings thus provide on-line evidence for the influence of differently motivated interpretation processes on the integration of personal and reflexive pronominal clitics into the sentential structure.

5. Conclusion

The results of the investigation of negative imperatives in Bulgarian bear relevant implications for the theory of tense and aspect in general, as well for the issue of how the different levels of linguistic representation intertwine to yield a pragmatically well-formed request. The specific morpho-syntactic and phono-syntactic well-formedness restrictions of negative imperatives served as a magnifying glass to developmental changes in the acquisition of negation and verbal aspect in deontic context. These properties also allowed for an experimental investigation of the normal and agrammatic processing of negation, aspectual affixes and pronominal clitics during online sentence comprehension.

In Bulgarian, prohibitive imperatives present a context of aspectual coercion induced by the presence of negation as a temporally sensitive sentential operator. The scope relation between imperative mood, negation and aspect yields the configuration of the imperfective present which has to be overtly expressed and prompts the overt imperfective marking of the predicate. The productivity and transparency of the imperfectivising mechanism relates to the organisation of the TAM categories in Bulgarian which not only promotes the representation of fine perspective shifts but also provides for their distinct morphological expression.

The production study on the acquisition of negative imperatives deepens our understanding of the way children represent negation in deontic contexts as reflected in their use of aspectually appropriate predicates. Our findings suggest that children are sensitive to the

imperfectivity requirement in negative imperatives from early on. The imperfectivisation strategies apparent in their production data also reveal a well established representation of the structure of morphologically complex verbs. Decomposition into an imperfective root and perfective affixes is a fast and reliable way to access an imperfective verb. Secondary imperfectivisation by means of the *-va* suffix is used productively in target and in overgeneralised forms as aspectual inflection. The relatively low production of target secondary imperfectivised prefixed verbs cannot be explained with morphological processing deficits but rather indicates that up to the age of five children experience difficulties to apply a progressive view point to accomplishments according to the aspectual construal of negative imperatives.

The online sentence comprehension studies present evidence that neurologically unimpaired Bulgarian speakers profit from the syntactic and prosodic properties of negation during online sentence comprehension. The syntactic features of negation as a functional category increase structural predictability and facilitate the processing of the locally dependent lexical and functional items. The scope relation between mood, negation and aspect imposes an imperfectivity requirement on the predicate and speeds up lexical access to imperfective verbs. Similarly, clitic pronouns are more accessible after negation due to the phono-syntactic properties of clitic clusters. If parsed as object agreement markers, personal direct object clitics are less resource demanding than reflexive clitics. This finding is indicative of the syntax-driven co-reference establishment processes (binding) triggered through the lexical specification of reflexive pronouns.

The results obtained from Bulgarian Broca's aphasics show that they exhibit processing patterns similar to those of the control group. Notwithstanding their slow processing speed, the agrammatic group showed no impairment of negation as reflected by their sensitivity to the aspectual requirements of negative imperatives. Perfective verbs after negation increased the processing load while imperfective verbs reduced it. The obtained on-line processing data are indicative of a slowed-down but preserved ability to parse the structural dependency between mood, negation and aspect as morphologically expressed functional categories and to exploit their semantic features in contexts of aspectual coercion. Nevertheless, the aphasic participants appear to have a comprehension deficit as reflected by their responses to content questions. Due to their restricted processing resources, the aphasic speakers face problems to construct and maintain an integrated semantic representation needed in order to answer content questions during an online task. Structures with higher semantic complexity increase the processing load and cause temporal mismatches which eventually disrupt comprehension. This finding is supported by the processing differences between personal and reflexive pronominal clitics. Similarly to the control group, aphasic speakers take longer to process sentences containing

reflexive pronouns which are subject to the same syntactic and prosodic restrictions as those containing personal pronouns. Evaluated against cross-linguistic findings, the obtained result strongly suggests that aphasic performance with pronouns depends on the interpretation efforts associated with co-reference establishment and varies due to availability of discourse referents.

The investigation of normal and agrammatic processing of Bulgarian negative imperatives presents support for the hypothesis that the comprehension deficits in Broca's aphasia result from a slowed-down implementation of syntactic operations. The protracted structure building consumes processing resources and causes temporal mismatches with other processes sustaining sentence comprehension.

The investigation of the way Bulgarian children and aphasic speakers process negative imperatives reveals that they are highly sensitive to the imperfective constrain on the aspectual construal imposed by the presence of negation. The imperfective interpretation requires access to morphologically complex verb forms which contain aspectual morphemes with conflicting semantic information – perfective prefixes and imperfective suffixes. Across modalities, both populations exhibit difficulties in processing prefixed imperfectivised verbs which as predicates of negative imperative sentences reflect the inner perspective the speaker and the addressee need to take towards a potentially bounded situation description.

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Aspectual coercion in Bulgarian negative imperatives

Abstract

Slavic languages feature negative imperative constructions (NI) with a genuine verbal imperative inflection. Bulgarian constitutes a partial exception, prohibiting NIs with perfective verbs, even in preventive NIs, for which Slavic languages utilise perfective verbs. In this article we argue that Bulgarian NIs present a case of aspectual coercion (Moens & Steedman 1988). The overt coercion is due to the morpho-syntactic properties of the Bulgarian aspectual system, promoting secondary imperfectivization. The reasoning follows the cognitive approach of time categorisation (Klein 1994) and shows that the aspectual construal in NIs yields the temporal configuration of imperfective present in prohibitives, but a future interpretation in preventives. The aspectual restriction in Bulgarian arises from the inability of bare perfective verbs to express tense in the main clause, in contrast to other Slavic languages. The TAM system in Bulgarian converges towards analytic markings of distinct aspectual-temporal configurations minimising the functional load of perfective verbs.

1. Introduction

According to traditional definitions (Jespersen 1924: 313; Lyons, 1977: 792), modality expresses the attitude of a speaker towards the validity of the proposition given in an utterance. Modality is thus omnipresent and becomes reflected in the grammaticalisation of mood as an inflectional category. Bybee and Fleischmann (1995: 5) differentiate between agent-oriented and speaker-oriented modalities. Indicative mood reflects an agent-oriented modality, as it directs the spotlight towards the propositional content. Imperative mood is an instantiation of deontic modality as a speaker-oriented type of modality. Deontic modality represents a specific relation between speaker and addressee in which the speaker is in a position of authority and thus able to impose requirements on the addressee and to expect that these are fulfilled by the addressee.

Slavic languages express deontic modality synthetically by means of verbal imperative inflection (1), or analytically in constructions containing modal elements, be they modal verbs (2), adverbs, or particles (3)¹.

- (1) *Nale-j vino v čašite !* (Bulgarian)
 pour.PF-2SG.IMP wine.N.SG.INDEF into glass.F.PL.DEF
 'Pour some wine into the glasses!'

¹ Glossary: ACC – accusative case, COMP – complementiser, DEF – definite noun (with a definite article), F – feminine gender, IMP – imperative mood, IMPF – imperfective aspect, INDEF – indefinite/bare noun, M – masculine gender, N – neuter gender, NI – negative imperative, NOM – nominative case, OT – obligation time, reference time of imperative clauses, PF – perfective aspect, PL – plural, PRES – present tense, S – time of speaking, SG – singular, TT – topic time.

(2) *Trjabva da naleeš vino v čašite !*
 must. MODAL VERB to.COMP pour.2SG.PRES.PF wine.N.SG.INDEF into glasses.F.PL.DEF
 'You must pour some wine into the glasses!'

(3) *Neka (tja) nalee vino v čašite !*
 let.PARTICLE (she) pour.3SG.PRES.PF wine.N.SG.INDEF into glasses.F.PL.DEF
 'Let her pour some wine into the glasses!'

The synthetic expression of imperative mood follows a general pattern which holds for all Slavic languages. The verbal stem consisting of the verbal root and aspectual affixes carries the imperative morpheme (often a thematic vowel) and may receive a plural marker (4). Imperatives are immanently oriented towards an addressee and therefore not compatible with flexives marking person agreement with grammatical subjects.

The following examples from Bulgarian and Russian illustrate the derivation of imperative verb forms by means of the main Slavic imperative morphemes *-i/-j* combining with consonantal (4) and vocalic stems (5) respectively.

| | | | | |
|-----|-----------------------|-----|---------------------|-------------|
| (4) | <i>na-le-ja</i> | vs. | <i>na-le-j-te</i> | (Bulgarian) |
| | PF-pour.IMPF-1SG.PRES | | PF-pour.IMPF-IMP-PL | |
| (5) | <i>govor-it'</i> | vs. | <i>govor-i</i> | (Russian) |
| | speak.IMPF-INF | | speak.IMPF-IMP | |

Based on the peculiarities of the speaker-oriented mood, the temporal interpretation of an eventuality verbalised in an imperative expression oscillates between present and future readings, being maintained in the tension between two possible perspectives on the expressed content. On the one hand, imperatives are immanently prospective (cf. Palmer 1986:112) because they establish a directive concerning a future activity or a state of affairs to be set up by the addressee (addressee's perspective). On the other hand, imperatives obtain a present meaning if we take into account that the obligation they express is valid at the moment of speaking (speaker's perspective). In this respect, synthetic imperatives are not compatible with tense markers and are defined as tenseless verbal forms (for further discussion of synthetic imperatives as verbal forms which are primitive with respect to the set of morphological categories they express, see Donhauser 1987). Imperative forms carry aspectual information, but abstract from a clear-cut temporal assignment of the event. In sum, synthetic imperatives constitute a suitable testing ground for a study targeting the effects of verbal aspect and its interactions with aspectually sensitive sentential operators on the modal interpretation and on its formal expression.

In this paper we concentrate on negative imperatives as constructions which show specific effects of verbal aspect on the overall meaning construal of imperative utterances as interpersonal communication acts. Slavic languages feature genuine negative imperatives. In this regard, Slavic languages do not exhibit the incompatibility between imperative mood and negation known from other languages (for overview and analyses of the phenomenon, e.g. in the Romance languages, see Wratil 2005; Zanuttini 1997).

Bulgarian constitutes a partial exception from this picture because negative imperatives are built only with imperfective verbs. Negative imperatives with perfective verbs are equally ungrammatical in both the prohibitive and the preventive type of synthetic imperative constructions. The restriction of the prohibitive type to imperfective verbs is a phenomenon Bulgarian shares with other East Slavic languages, which, however, exhibit different degrees of compliance to that general pattern. The ungrammaticality of preventive negative imperatives with perfective verbs is a structural peculiarity which sets Bulgarian apart from all other Slavic languages. In the field of Slavic studies we find a general consensus that the perfective aspect of the verb is one of the main defining characteristics of preventive constructions. As a result, the following questions arise: Which properties of Bulgarian are responsible for the loss of synthetic preventives with perfective verbs? Is there a common source of the aspectual incompatibilities observed in both types of negative imperative constructions?

The aim of the present study is to present a unified account of the aspectual restrictions in prohibitive and preventive negative imperatives. We want to argue that Bulgarian negative imperatives present contexts of aspectual coercion in the sense of Moens & Steedman (1988). The coercive process produces an overt morphological reflex in accordance with the morphological means Bulgarian has at its disposal in order to express the obtained aspectual meaning. The phenomenon of aspectual coercion observable in Bulgarian negative imperatives is due to the inability of bare perfective verbs to express tense as predicates in the main clause, in contrast to the perfective verbs in other Slavic languages. This major typological difference is to be evaluated from the perspective that Bulgarian exhibits the most complex TAM system promoting explicit markers of fine grained aspectual-temporal configurations.

2. Aspect in negative imperatives – function and interpretation

The impact of verbal aspect on the modal interpretation concerning deontic necessity implied by perfective and imperfective verbs has been discussed controversially in the field of Slavic studies. Gerganov & Nikolov (1983) conducted a psycholinguistic study targeting a theoretical statement of Andrejčin (1978), which claimed that in Bulgarian, imperfective imperatives convey the sense of a more urgent and thus stronger command. They found out that Bulgarian speakers perceived perfective imperative forms as the ones expressing stronger obligation. The

outcome of the study allows only a weak generalisation if we consider two details. Firstly, the materials included only bare imperative forms from aspectual pairs of the type simplex perfective – suffixed imperfective. An examination of verbs which are members of aspectual triplets (23) might have produced a different result. Secondly, the authors equalled strong command with rude command, thus translating the grammatically coded meaning of action completion to the level of socially regulated norms such as politeness. As such culturally defined notions are strongly driven by context and intonation patterns, the pros and cons for specific politeness functions of perfective and imperfective verbs in imperatives are quite balanced and ultimately language-specific (Benacchio 1997; see Mileva 1980 for a comparison between Polish and Bulgarian imperatives in terms of politeness).

Diverging from its interpretation in positive imperatives, verbal aspect plays a decisive role in negative imperative constructions. Negative imperatives may be roughly divided into prohibitives and preventives according to the aspectual value of their predicates (see definitions and their motivations in Chrakovskij & Volodin 1986: 147–154). Both main types exist in the Slavic family, although with varying functions and degrees of applicability of the respective verbal aspect.

The imperative marker itself doesn't provide a cue for distinguishing between prohibitive and preventive negative imperatives, which nevertheless represent quite different constructions. By using a prohibitive, the speaker utters a demand for the addressee to stop an ongoing activity or to refrain from an activity bringing about an unwanted situation. The speaker wants the realisation of the demanded situation and believes that the addressee is willing and able to comply with the demand.

In contrast to the functions and the felicity conditions of the prohibitive imperative type, the preventive type is linked with a warning that the current activities of the addressee are likely to bring about a state of affairs to the detriment of a participant in the situation. The speaker aims at preventing the situation which is verbally expressed, while the current activities of the addressee are not mentioned explicitly. Moreover, the speaker believes that the addressee is not aware of the disadvantageous consequence of his/her activities and cannot control it.

In most Slavic languages, prohibitive and preventive negative imperatives are formally differentiated by the aspect and the semantic class of the verb. While prohibitives are built with agentive imperfective verbs, preventives are the domain of ergative, de-causative perfective verbs. Traditionally, the main distinction between prohibitive and preventive meanings has been based on the combination of verbal aspect with specific verb classes, taking into account the impact of the entire syntactic context on the meaning construal (cf. Chrakovskij 1990 on the interpretation of negative imperatives in Russian).

Taking a different approach, Bulygina & Šmelev (1997, 1999) argue that the semantic feature of (un)controllability dominates the contribution of the perfective aspect and determines the interpretation of the negative imperative. Discussing examples like (6) versus (7), they conclude that deontic modality instantiated by a prohibitive interpretation is expressed by (6) because it refers to a controlled action, while (7) is a warning against an uncontrollable accident.

(6) *Ne budite otza !*
 not wake up 2PL.IMP.IMP.F father.M.SG.ACC
 'Don't wake up the father (intentionally)!'

(7) *Ne razbudite otza !*
 not wake up 2PL.IMP.PF father.M.SG.ACC
 'Don't wake up the father (unintentionally)!'

(8) *Razbudite otza !*
 wake up 2PL.IMP.PF father.M.SG.ACC
 'Wake up the father (intentionally)!'

(9) *Šum razbudit otza.*
 noise.M.SG.NOM wake up.3SG.PRES.PF father M.SG.ACC
 'The noise will wake up the father.'

However, Bulygina & Šmelev (1997, 1999) rely heavily on the non-linguistic context when interpreting the meaning of the verb. It is the eventuality of “waking up somebody” which may be caused unintentionally by the addressee, but which also may be carried out on purpose as in (8). Contrasting the readings of (7) with (9) it turns out that the perceived uncontrollability in the negative imperative is not due to the semantics of the verb *razbudit'* as such, but that it is induced by the syntactic environment: by the presence of the negative operator in (7). The non-agentive noun in subject position produces a similar effect in (9). Certainly, the modal interpretation of utterances is sensitive to pragmatic influences ranging from discourse type to world knowledge applicable in specific situations.

Discussing the properties of preventive constructions in Russian, Birjulin (1994) points out that preventives are not restricted to non-agentive verb classes. He argues that perfective verbs like *ispačkat'* “soil”, *razbit'* “break” appropriately denote actions which are purposeful and controlled. The verb *razbudit'* fits perfectly in a class of verbs which are not specified for controllability because the action of *waking up somebody* may be conducted intentionally and in a controlled manner, but it may also happen as an unwanted accident. Such verbs seem not

to impose restrictions on the thematic role of the external argument, allowing either an agent or a cause.

Having these considerations in mind it turns out that the interpretation of the utterances in the minimal pair as prohibitive in (6) and preventive in (7) becomes determined by the verbal aspect. The verbs *budit'*.IMPF – *razbudit'*.PF ("wake up") enter into an opposition comparable to the one of *pisat'*.IMPF – *napisat'*.PF ("write"), the classic example of an aspectual pair built from a primary imperfective verb and its prefixed perfective counterpart. In both cases the perfective verb is blocked for secondary imperfectivization.² Additional support for the decisive role of verbal aspect is provided by Birjulin's comment (1994: 101) that verbs expressing states like *bojat'sja* "to fear" cannot be used in preventive constructions because such verbs are *imperfectiva tantum*, not featuring perfective counterparts.

The majority of Slavic languages uses verbal aspect for the differentiation of prohibitive and preventive readings of negative imperatives, albeit in different ways. While Czech and Slovenian regularly use perfective verbs in preventives, Serbian restricts the range of synthetic preventives to verbs expressing psychological states (10), (Ivić 1958). In all other cases, periphrastic *da*-construction must be used (11).

- (10) *Ne zaboravi!* (Serbian)
 not forget.2SG.IMP.PF
 'Don't forget!'
- (11) *Pazi, da ne prospesh!*
 take care.2SG.IMP. IMPF to.COMP not oversleep.2SG.PRES.PF
 'Be careful not to oversleep!'

Bulgarian disallows negative imperatives with perfective verbs in both cases. Prohibitive imperatives with perfective verbs are ungrammatical (12), and the same is true for preventive negative imperatives (13), in contrast to other Slavic languages.

- (12) **Ne nalej vino v čašite za kafe!* (Bulgarian)
 Not pour.2SG. IMP.PF wine into the cups for coffee
 'Don't pour wine into the coffee cups!' (prohibitive)

² According to a very strict definition of aspectual pair, only verbs yielded by secondary imperfectivization are considered true aspectual pairs, the perfective and imperfective verb being forms of the same lexeme. As a consequence, a huge number of verbs has to be regarded as *imperfective tantum* and falls out of the morphological aspect category. The notion of (purely) perfectivizing affixes and the functions of perfective verbs in the tense systems provide the basis for a broader understanding of aspectual pairs, even if their members are not taken to constitute parts of the same lexeme (cf. Lindstedt 1985; Forsyth 1970).

- (13) * *Ne razlej vinoto !*
 not spill.2SG.IMP.PF wine.N.SG.DEF
 'Don't spill the wine!' (preventive)
- (14) *Ne nalivaj vino v čašite za kafe !*
 not pour.2SG.IMP.IMP.F wine into the cups for coffee
 'Don't pour wine into the coffee cups!' (prohibitive)

Bulgarian speakers must use imperfective verbs when deciding on a synthetic imperative form in order to express a negative request (14). From a synchronic point of view, the comprehensive aspectual restriction on perfective verbs developed steadily from an original tendency visible already in the Old Slavic period. Georgiev (1934) shows that in Bulgarian, synthetic negative imperatives with perfective verbs were gradually replaced by synthetic, and more importantly by analytic constructions with imperfective verbs. He argues that this development is due to euphemistic strategy, because perfective verbs express a stronger command. The plausibility of Georgiev's explanation in terms of euphemistic usage of imperfective verbs is weakened by the fact that this strategy circumvented the positive imperatives.

In our view, the aspectual restriction resulted from changes in the system of verbal categories, both in terms of their organisation and morphological manifestation. The infinitive was lost in the Middle Bulgarian period (13th–15th century) under the influence of language contact. It is one of the main characteristics of the languages in the *Balkansprachbund* that the functions of the infinitive are transferred to subordinated clauses introduced by a complementizer, instantiated by the particle *da* in Bulgarian and Macedonian. A second relevant change is the development of an analytic future construction and the gradual integration of the perfective verbs in it. At the same time, Bulgarian preserved the Old Slavic tripartite structure of past tenses: aorist, imperfect, and perfect. These are just some exemplifications of the manifold transformations in the TAM categories, which, taken together, effected in the present system the necessity for an exact and multi-layered temporal location and for its overt marking. In effect, the synthetic imperative became the only verb form which is not tensed in Bulgarian.

3. Aspectual coercion in prohibitive negative imperatives

In this paper, we will argue that Bulgarian synthetic negative imperatives constitute an example of aspectual coercion with an overt morphological reflex. The term aspectual coercion is used in the sense of Moens & Steedman (1988). The authors define aspectual coercion

as an aspectual type-shift operation induced by a sentential modifier. Depending on the morpho-syntactic properties of a given language, the coercion takes place covertly or overtly by prompting specific morphological markers (Moens & Steedman 1988: 20).

- (15) *The favourite won the race.*
- (16) *The favourite won the race for several years.*
- (17) **The favourite won the race for the first minutes.*
- (18) *The favourite was winning the race for the first minutes.*

The phenomenon of covert type shifting exemplified in (16) has received more attention in the literature as it represents a case of enriched semantic composition. The interpretation process can be seen as an integrative inference from the properties of all aspectually sensitive elements in the sentence. A conspicuous example of covert aspectual coercion is the iterative interpretation of a core sentence containing a punctual verb and a singular object in the presence of a durational adverb as in (16). In the absence of sentential operators the core sentence (15) receives a single instance reading, but the aspectual features of the durational adverb invoke a repetitive reading – iteration of the action within the time span given by the adverbial. From a processing point of view, the semantic mismatches between the aspectual properties of the verbal phrase and the adverbial modifier involve a process of reinterpretation reflected in an increased processing load (Piñango, Zurif & Jackendoff 1999).

In English, the proposition in (15) denotes a culminated process. The actor has achieved a change from a preparatory state in which the race is still going on, and the favourite is only a potential winner to a resulting state in which the favourite is the winner *de facto*. The presence of an adverbial phrase referring to a time span situated in the preparatory state before the culmination has been reached, as in (17), hardly makes any sense, because of the aspectual clash between the terminative meaning of the verbal phrase and the durational meaning of the *for*-phrase. The syntactic environment induces a reinterpretation of the proposition as referring to a process (*be winning a race*), but it becomes felicitous only in the presence of a progressive auxiliary and the *ing*-infinitive. English handles propositions expressing processes and progressive states by marking them overtly by means of progressive auxiliaries (18). In the case of Bulgarian negative imperatives, we encounter aspectual coercion reflected overtly by the obligatory use of imperfective verb forms, be they simplex imperfective or secondary imperfectivized forms.

In the following, the aspectual construal of imperative utterances will be depicted within the cognitive approach of time categorisation in language by Klein (1994) which is principally compatible with the approach of Moens & Steedman (1988), both theories adopting

Reichenbach's (1947) notion of point of reference (Reichenbach 1947: 288ff.). The notion of finiteness is crucial for Klein's (1994) approach to temporality, which is, as he maintains, one of the main semantic features human language is bound to express. Finiteness or the expression of tense (both terms are taken as synonymous) signals that a speaker makes a truth assertion restricted to a time span which is located with respect to the time of speaking (Klein 1994: 3f.). This combination of a truth claim and a time stretch, called "topic time" (TT), is also essential for the definition of aspect. Depending on the relations of inclusion or exclusion between topic time and the duration of a situation, different aspectual values are yielded. Perfectivity means a full or partial inclusion of the situation stretch in topic time, which is perceived as an external perspective on the eventuality. The typical internal perspective conveyed by imperfective verbs results from the inclusion of topic time in the time span of the situation. Topic time as the main reference frame is the pivot mediating between the other two temporal parameters, the time of utterance and the time of the situation.

Imperatives do not feature a genuine topic time because an unrestricted truth claim cannot be made about a situation whose realisation depends on the abilities of the addressee. Imperatives contain a reference time span constraining an obligation. Obligation time (OT) includes the time of speaking because the demand is valid at the moment the imperative is uttered. According to this criterion, imperatives may be perceived as present forms. In contrast to this temporal interpretation, the prototypical imperative utterance exhibits an inherently prospective meaning because it refers to states of affairs to be obtained upon activities subsequently carried out by the addressee³. Consider the aspectual configuration obtained in (19), which is a Bulgarian positive imperative containing a perfective verb.

- (19) *Nalej vino v čašite!*
 Pour.2SG.IMP.PF wine.N.SG.INDEF into glasses.F.PL.DEF
 'Pour some wine into the glasses!'⁴

Perfective verbs express a qualitative change of state, a transitional process from a preparatory state to a resultant state. Perfective verbs focus the reference time on the resultant state. From the perspective of aspectual construal, the use of a perfective verb in an imperative utterance emphasises the completeness of the requested situation because the resultant state is included in the time stretch of obligation (OT).

³ Birjulin (1994: 48-60) classifies the imperative utterances according the feature [+/- required change of the existing situation]. In this paper we concentrate on the prototypical type of positive imperatives reflecting the case in which the denoted eventuality has to be brought about by the addressee in the future [+change].

⁴ Note that Bulgarian encodes nominal definiteness by means of enclitic definite articles. In the given example the bare noun *vino* acquires a type reading; the use of the definite article *vinoto* "the wine" would mark a specific quantity of wine.

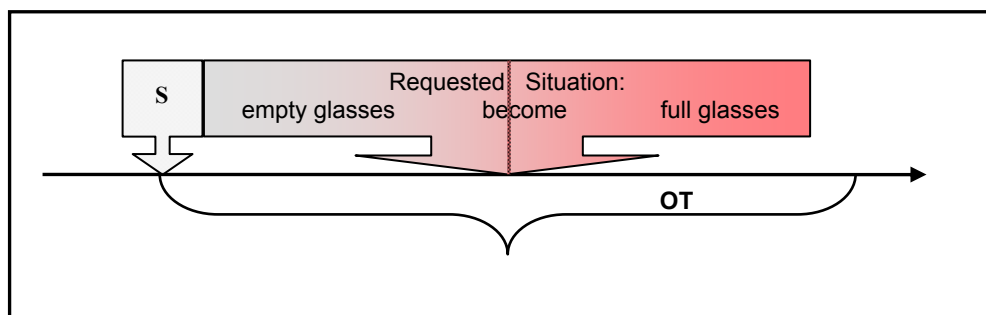


Figure 1: Aspectual construal of positive imperatives with perfective verbs

The necessity for a current situation to be altered by the addressee appears to be a basic element of deontic meaning. This notion of change becomes endorsed through the change of state expressed by perfective verbs. Additionally, the inherent prospectivity of the imperative aligns with the inherent prospectivity of perfective verbs which results from the sequencing of the preparatory and the resulting state on the time axis, thus strengthening the perception of distance between the time of speaking and the resultant state. This categorical affinity explains the fact that imperatives with perfective verbs are the most neutral means to express a polite request in all Slavic languages with the exception of Russian.⁵

In imperatives, negation usually operates on the proposition, directly influencing the aspectual interpretation. In the case of Slavic synthetic imperatives, negation affects a predicate featuring at most two verbal categories – aspect and number. Negation affects the perfectivity of the predicate by discarding the change of state expressed by perfective verbs. The spotlight of the verbal reference time span moves from the resultant state back to the source state.

- (20) *Ne *nalej vino v čašite !*
 not pour.2SG.IMP.PF wine.N.SG.INDEF into glasses.F.PL.DEF
 'Don't pour wine into the glasses!'

Uttering (20) the speaker wants the addressee to preserve the initial state of affairs, namely to leave the glasses empty. The reference time of the imperative (OT) becomes included in the situation time, yielding an imperfective interpretation. Under negation, we obtain a combination of temporal values known as imperfective present – both, the time of speaking and the source state of the situation denoted by the verb, are included in the reference time of the obligation.

⁵ See Benacchio (2002) for a discussion of Russian polite requests containing imperfective verbs.

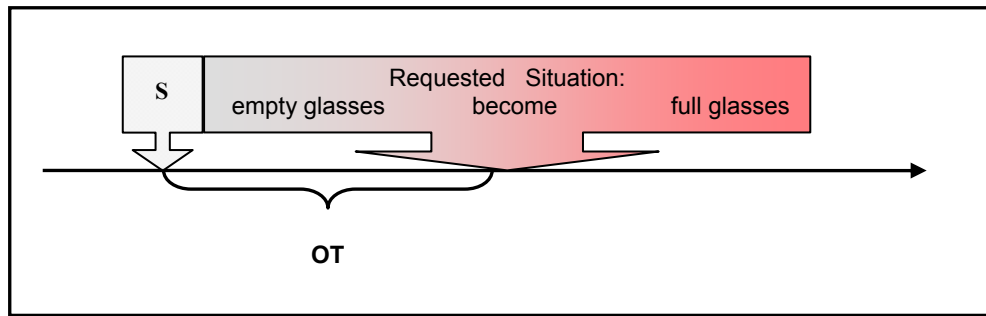


Figure 2: Aspectual construal in prohibitive negative imperatives

As a general rule, the Slavic languages reflect the aspectual configuration resulting from the type shifting process by the use of imperfective verbs. The application of this rule seems to depend on the properties of the aspectual systems found in the different branches of the language family. In Czech and Polish perfective verbs are not completely banned from expressing prohibitive meanings. The Polish example (21) containing a primary perfective verb is well-formed and expresses prohibitive meaning.

- (21) *Nie kupui vina!* (Polish)
 not buy.2SG.IMP.PF wine
 'Don't buy wine!'

In Bulgarian, the type shifting process proliferates as morphologically overt aspectual coercion instantiated by the obligatory use of imperfective verbs (14). A negative imperative utterance containing a perfective verb violates the morpho-syntactic requirement of an overt marking in the case that the reference time is included in the time stretch of the situation. In a neutral context example (20) is barred from expressing a prohibitive meaning, it is simply ill-formed.⁶

Bulgarian speakers adhere strictly to the morphological requirements imposed by the coercion process in negative requests. Kuehnast (2003) conducted a series of online, self-paced reading experiments in order to test sensitivity to this type of morpho-syntactic violation using pure aspectual pairs (simplex perfective verbs and their imperfectivised counterparts). In positive imperatives, the simplex perfectives were read faster than their imperfective partners not only because the suffixed imperfectives are one syllable longer, but because in positive contexts the imperfectivised verbs endorse a repetitive interpretation. Under negation, the morphologically shorter perfective verbs elicited longer reaction times, as the subjects

⁶ If the speaker does not respect the formal requirement (imperfective verb) imposed by the aspectual configuration of a prohibitive imperative, a completely different type of modal interpretation is yielded. The aspectual value of the perfective predicate is preserved because the negative modifier takes scope over the imperative force. The resulting double negation yields a positive interpretation to the effect that the formally expressed request to restrain from the verbalised activity is perceived as a strong threat to the addressee to carry out immediately the change of the current state of affairs denoted by the perfective verb.

hesitated after encountering the ungrammaticality of the given aspectual form. Importantly, the reaction times for the imperfectivised forms were clearly facilitated compared to reading times of the same verbs in positive imperative utterances. To sum up, the test participants demonstrated significant priming for the morphologically more complex imperfectivised verbs in negative imperatives, aptly exploiting the syntactic and semantic information of the negative modifier. In other words, the speakers acknowledged the aspectual construal in negative imperatives and opted for the morphologically appropriate imperfective form according to the well-formedness constraints in Bulgarian.

To what extent Slavic languages endorse the use of imperfectives in prohibitive utterances depends on two basic premises. The first one relates to the morphological organisation of the aspectual system – the presence and quantity of *perfectiva* and *imperfectiva tantum*, biaspectuality, derivational patterns of aspectual pairs. The second one concerns the functions of perfective and imperfective verbs in the domain of temporality and in the domain of quantificational phenomena (see Filip 1997 for a discussion of the orthogonal relation between the theta-grid of perfective verbs and the expression of nominal definiteness).

The aspectual system of Bulgarian provides sufficient morphological means to satisfy the requirements posited by a coercive process yielding an imperfective interpretation. Almost all perfective verbs have imperfective partners principally obtained through secondary imperfectivization⁷, thus rendering Bulgarian a language without *perfectiva tantum*. The maximal extend of secondary imperfectivization is the main feature of verbal aspectual system in Bulgarian, distinguishing it from other Slavic languages (Ivančev 1978).

Almost all simple and derived perfective verbs may be imperfectivised by means of imperfectivizing suffixes. Derived perfective verbs are obtained from simple imperfectives by means of perfectivizing prefixes and suffixes (Bojadziev, Kucarov & Pencev 1999: 487ff.). The derivational circle yields aspectual triplets in which the perfective and the secondary imperfective verb do not differ in lexical meaning. According to the traditional view (Maslov 1981; Zaliznjak 1977) only such verbs are considered to be forms of the same lexeme and thus to constitute an aspectual pair. Secondary imperfectivization operates only on the grammatical level and satisfies fully the requirements of the strict definition.

| | | | | | |
|------|--------------------|---|-------------------|---|-------------------------------|
| (22) | <i>pija</i> | – | <i>izpija</i> | – | <i>izpivam</i> |
| | drink.PRIMARY IMPF | | drink.PREFIXED PF | | drink.SUFFIXED SECONDARY IMPF |
| | 'drink' | | 'drink up' | | 'be drinking up' |

⁷

A few perfective verbs feature suppletive imperfective partners.

The most productive pattern of secondary imperfectivization is the derivation by means of the suffix *-va* and its allomorphs. Note that in Bulgarian secondary imperfectivization operates also on perfectives which are semantically very close to the primary imperfective verbs they are derived from. Even in closely related languages such as Serbian or Russian, secondary imperfectivization is blocked in aspectual pairs built by purely aspectual perfective prefixes.

| | | | | | | |
|------|-------------------|---|-------------------|---|----------------------|-------------|
| (23) | <i>piša</i> | – | <i>napiša</i> | – | <i>napisvam</i> | (Bulgarian) |
| | write.SIMPLE IMPF | | write.PREFIXED PF | | write.SECONDARY IMPF | |
| (24) | <i>pisat'</i> | – | <i>napisat'</i> | – | * <i>napisyvat'</i> | (Russian) |
| | write.SIMPLE IMPF | | write.PREFIXED PF | | | |
| (25) | <i>pisati</i> | – | <i>napisati</i> | – | * <i>napisivati</i> | (Serbian) |
| | write.SIMPLE IMPF | | write.PREFIXED PF | | | |

The regular and widespread application of secondary imperfectivization even to loan words (most of them biaspectual) mirrors the transition in the status of suffix *-va* from a derivational to an inflectional pattern. Although traditional grammar-books still describe aspect as a hybrid lexical-grammatical category and thus the process of secondary imperfectivization as a derivational process, more recent research (Manova 2005; Jetchev & Bertinetto 2002) has provided evidence that imperfectivizing suffixes are better understood as inflectional devices.

Manova (2005) considers several criteria discussed in the field of morphology research as relevant for the distinction between derivation and inflection. Evaluated against such decisive factors as preservation of word class, productivity, and consistent assignment of inflectional class, the main imperfectivization device in Bulgarian, the suffix *-va*, ought to be situated on the inflection side of the continuum between derivation and inflection. The author concludes that “in order to underline the inflectional status of imperfectivization, Bulgarian has developed a full set of aspectual forms“ (Manova 2005: 249).

Manova’s view is corroborated by the findings of a psycholinguistic study on the processing of Bulgarian verbs conducted by Jetchev & Bertinetto (2002). The study aims at clarifying possible differences in the representation of derivational and inflectional morphology in the mental lexicon. The authors conducted two experimental series using a lexical priming design. In order to minimise semantic effects, the authors targeted processing differences between inflectional suffixes (person and number endings) and derivational suffixes (imperfectivizing morphemes) by using two types of true aspectual pairs (no change of lexical meaning). The first aspectual type represents the regular imperfectivization pattern by means of suffix *-va*. The second type of aspectual pairs represents the non-productive pattern of imperfectivization by means of thematic vowel change. The experimental results do not

show any significant differences between the priming effects of the inflectional person–number endings and the allegedly derivational suffix *-va*. Although very reluctant to re-interpret the derivation versus inflection status of the imperfectivizing suffix, an option they discuss in the beginning of their paper, Jetchev & Bertinetto (2002) conclude that the processing differences between derivational and inflectional morphemes found in Serbian aspectual pairs by Feldman (1994) could not be confirmed for the productive imperfectivization pattern in Bulgarian. In other words, person-number inflections and the imperfective suffix are accessed through the same rule-based route.

The aspectual system in Bulgarian emphasises the imperfective side of the aspectual opposition. Imperfectivity as the focal property of the Bulgarian aspect opposition becomes transgressed to the temporal system. East and West Slavic languages are differentiated by the way they express habituality and historical present. East Slavic languages like Russian and Bulgarian restrain from using perfective verbs in such contexts. By contrast, Slovak and Czech (Isačenko 1960; Stunova 1993) but also Croatian and Slovenian, representing the South-West Slavic branch, freely employ perfectives to express iterativity, habituality, and historical present. In Bulgarian, the expression of historical present and related notions such as habituality and iterativity is the domain of secondary imperfective verbs. Secondary imperfectives are optimal candidates because they oscillate between perfectivity and imperfectivity, being able to actualise the appropriate meaning depending on the syntactic environment.

The process of secondary imperfectivization does not strip the boundedness meaning contributed by the perfective affix. Secondary imperfectivization positions the topic time on the transition between the initial and the resultant state of the situation and yields a configuration in which parts of both states are included in topic time. The aspectual value obtained is imperfective and allows a temporal relation of coincidence with the time of speaking. On the one hand, these aspectual characteristics determine the possibility to use those verbs in actual present for the expression of process aimed at a concrete goal, especially if they are supported by present temporal adverbials, like those with the meanings of “now”, “just”, or “immediately”. Being sentential modifiers, such adverbials induce a process of aspectual coercion similar to that in prohibitive negative imperatives.

On the other hand, secondary imperfectives preserve the meaning of complexity (two-state structure) expressed in the perfective stem, a feature which determines the use of perfective verbs in historical present in most of the Slavic languages. The imperfective suffix provides an overt marking of an aspectual construal in which the reference time coincides with the time of the situation, mainly when the reference time and the time of speaking are not identical. The main functional load of expressing non-actual present which the secondary

imperfectives have taken over from the perfective verbs determines the functional restriction of about 200 secondary imperfective verbs in Bulgarian. As a rule, they cannot be used for the reference to an eventuality which is ongoing at the moment of speaking, this function being the domain of the primary imperfectives (compare the aspectual triplet in (23)).

Bulgarian is the only Slavic language which preserves and reinforces the opposition between aorist and imperfect, both tenses accepting perfective and imperfective verbs. Imperfect tense signals the inclusion of topic time in the time span of the situation, both temporal values being anterior to the time of speaking. Imperfect is a non-resultative past tense which instantiates the multiplication of the original viewpoint, the time of speaking, by its distinct inflection.⁸ In Bulgarian, the imperfect tense formed with imperfective verbs expresses in the plane of the past the same aspectual configuration as imperfective present tense.

4. Coercive processes in preventive negative imperatives

The type of aspectual coercion operative in the prohibitive negative imperative still does not explain the loss of the synthetic preventive in Bulgarian. In the following, we want to present arguments supporting the hypothesis that Bulgarian perfective verbs cannot satisfy the interpretation requirements imposed by the semantic composition of preventives. As the acquired aspectual-temporal configuration cannot be satisfied by a perfective imperative verb form, the whole derivation crashes.

Preventives warn the addressee of undesirable consequences which are predictable from his/her current activities. Slavic languages use negative imperatives with perfective verbs to express preventive meaning (26) – (28).

- (26) *Ne zaboravi!* (Serbian)
 not forget.2SG.IMP.PF
 'Don't forget!'
- (27) *Ne upadi!* (Russian)
 not fall.2SG.IMP.PF
 'Don't fall down!'
- (28) *Nie zbij szyby!* (Polish)
 not break.2SG.IMP.PF window glass.F.SG.ACC
 'Don't break the window pane!'

⁸ The organisation of the tense system in Bulgarian substantiates Leiss' (1992: 24; 208ff. *et passim*) theory of verbal categorisation as an incremental hierarchical structure of categories: Aspect < Tense < Mood/Modality (as opposed to TAM) – if the latter should imply any such hierarchical order in the first place.

Preventives comprise several meaning elements. Some of them are represented formally – the request by means of a synthetic imperative maker, negation in the form of the sentential negative operator and the event formulated in the verbal phrase. The task of the addressee is to infer from the combination of these elements that the utterance is a hint to change the current behaviour, which is not mentioned explicitly.

Consider a situation in which there is a cup on a table and a child is pulling the table cloth. Under such circumstances, the mother may produce a preventive utterance:

- (29) *Ne razbej čašku!* (Russian)
 not break.2SG.IMP.PF cup.F.SG.ACC
 'Don't break the cup!'

World knowledge and experience allow the mother to evaluate the situation with respect to possible consequences from an activity like pulling the table cloth and with respect to the probability that the ultimate effect of the pulling will be a broken cup.

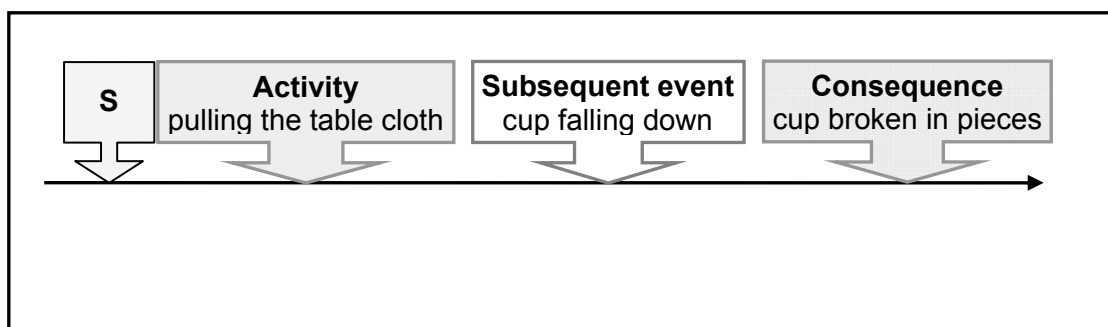


Figure 3: Aspectual and temporal configuration of preventive imperatives

Preventives depict a complex situation representing a cause-effect chain, from which only the last link is addressed. The proposition in (29) actually expresses a prediction about a future event. The context in which the preventive may be uttered felicitously provides also for the appropriateness of an affirmative indicative utterance of the type given in example (30)(4).

- (30) *Ty razbjoš čašku!* (Russian)
 you break.2SG.IMP.PF cup.F.SG.ACC
 'You are going to break the cup!'

Considering the English translation of (30) it turns out that the Russian perfective verb has to be glossed with the *going to* future marker. The periphrastic construction ‘*to be going to + infinitive*’ is used in cases in which the speaker has enough evidence that the expected future situation will obtain. Under such circumstances the majority of Slavic languages employ perfective verbs as synthetic future tense markers. In Bulgarian, bare perfective verbs cannot

express future tense as predicates in the main clause. Future tense is obligatorily marked by the auxiliary verb *šće* "will" combined with both imperfective and perfective verbs. Slavic languages (with the exception of those being members of the Balkansprachbund, or gravitating to it) express future tense preferably by perfective verbs or by analytic constructions containing the present form of the auxiliary *be* with the respective subject agreement markers and the imperfective infinitive.

The future interpretation of the present forms of perfective verbs is due to their feature of event sequencing *sekventnaja svjaz* discussed in Barentsen (1998). The reference time of perfective verbs is focused on the resultant state. The aspectual configuration amounts to a full inclusion of the resultant state in the reference time. Consider that the situation time of a perfective verb includes two states. Ordering the speaking event and the complex event containing a change from a preparatory to a resultant state on the time axis, we obtain a sequence of time spans. The main property of this concatenation of events is the creation of a distance relation between the speaking event and the time stretch in which the resultant state obtains. The distance relation between the time of utterance and the resultant state produces a prospective meaning, which then receives a future temporal interpretation.

In Bulgarian, the prospectivity of perfective verbs is not a sufficient condition for the expression of future tense and therefore, perfective verbs are not employed as future predicates in main clauses. The literal translation of the Russian assertion about the expected future event (30) into Bulgarian is ungrammatical with a bare (formally present) perfective verb (31).

(31) * *Sčupiš čašata.*⁹
 break.2SG.PRES.PF cup.F.SG.DEF
 '*You break the cup.'

(32) *Šće sčupiš čašata.*
 will.AUX.FUT break.2SG.PRES.PF cup.F.SG.DEF
 'You will / are going to break the cup.'

If the topic time is posterior with respect to the time of utterance, this exclusion relation has to be signalled overtly by the future auxiliary (32). In other words, finiteness in general and future tense of perfective verbs in particular have to be obligatorily marked overtly in Bulgarian. If negation applies to the proposition of (32), the process of aspectual coercion becomes operative again. The aspectual construal renders topic time and the time of utterance simultaneous with the preparatory state of the verb. In Bulgarian, this configuration is

⁹ Note that Bulgarian is a strong subject-drop language. Although the use of the personal pronoun is possible, pronoun-drop is the preferred option.

expressed by an analytic form containing a present negative auxiliary and a subordinated clause (as an infinitive substitute).

- (33) *Njama* *da* *sčupiš* *čašata.*
 not obtaining.NEG.AUX.PRES that.COMP break.2SG.PRES.PF cup.F.SG.DEF
 'You will not break the cup.'

Given that the temporal configuration is already synthetically or analytically expressed in the main clause, nothing prevents perfective verbs from signalling future as a relative tense in the subordinated clause, using the Slavic mechanism of event extension through state sequences as described above.

Bulgarian speakers have a different construction at their disposal if they want to utter a warning.

- (34) *Da* *ne* *sčupiš* *čašata!*
 that not break2SG.PRES.PF cup.F.SG.DEF
 'Don't break the cup.'

The analytic form reflects in a direct way negation of the proposition, denoting a disadvantageous state of affairs expected to obtain in the future. According to the system-induced explicit mapping between temporal values and their morpho-syntactic expression, the speakers of Bulgarian use an appropriate analytic construction. The meaning of (34) is best understood as an ellipsis of a sentence containing a modal verb (35) or a positive imperfective attention call (36)

- (35) *Iskam* *da* *ne* *sčupiš* *čašata!*
 want 1SG. PRES. IMPF that not break2SG.PRES.PF cup.F.SG.DEF
 'I want you not to break the cup.'
- (36) *Vnimavaj* *da* *ne* *sčupiš* *čašata!*
 Take care 2SG. IMP. IMPF that not break2SG.PRES.PF cup.F.SG.DEF
 'Take care not to break the cup!'

In the Slavic type of preventive construction (29), the speaker produces a warning in order to avoid a predicted situation, formally expressed in the negated proposition. It is important to keep in mind that the features of uncontrollability and unintentionality often carried by the perfective verb do not refer to the ongoing concrete activities, the change of which is requested from the addressee. If this were the case, the speaker would violate the principle of cooperative behaviour, and in particular the maxim "Be relevant." (Grice 1975: 26–30), by demanding

something impossible. The imperative force is directed to an activity or a state of affairs which the addressee is indeed able to control. As the speaker does not address the current activities of the addressee by uttering a direct command, the preventive construction expresses only a weak prohibition.

Slavic preventives contain an imperative form, but gravitate to the domain of epistemic expressions because the elements of knowledge (justified prediction of an annoying event) dominate the elements of obligation (cf. von Wright 1951: 1f.). The relevance of the temporal-aspectual construal and its impact on the overall interpretation of the preventive as expressing a wish are respected in Bulgarian to the extent of rendering the synthetic imperative inflection inappropriate. Additional support for the evaluation of preventive expressions as exhibiting strong inclination towards epistemic readings is provided by the fact that Bulgarian analytic preventives are not restricted to perfective verbs.

5. Summary

Approaching the interpretation of Slavic negative imperatives from the perspective of aspectual composition, we targeted the variation of compatibilities and incompatibilities of imperative mood and verbal aspect displayed in different Slavic languages. Against this background, we presented a unified account of the obviation of perfective verbs in Bulgarian negative imperatives. Discussing the distinct aspectual configurations acquired in the prohibitive and preventive negative constructions, we argue that sentential negation induces aspectual coercion, which in Bulgarian must be reflected overtly.

In the prohibitive, the negative operator affects the perfective meaning by cancelling the change of state denoted by perfective verbs. The reference time of the imperative, which is a time stretch constraining an obligation, becomes included in the situation time, or more precisely in the preparatory state of the perfective verb, yielding an imperfective interpretation. Under negation we obtain a combination of temporal values known as imperfective present: both, the time of speaking and the source state of the situation are included in the obligation time span. This causes a mismatch between the overall aspectual construal of the negative imperative and the aspectual value of the perfective verb. In Bulgarian, prohibitive imperatives present a context of aspectual coercion which is reflected overtly by the compulsory use of imperfective verbs, prompting secondary imperfectivization. Only secondary imperfective verbs allow an inclusion of the time of speaking into the reference time, while indicating the boundedness of the situation. The productivity and transparency of the imperfectivizing process in Bulgarian enhanced the spread of secondary imperfective verbs within the temporal domain. In contrast to the West Slavic languages, the secondary imperfective verbs have taken over the expression of historical present, habituality, and iterativity from the perfective verbs.

The analysis of Slavic preventives shows that a perfective predicate is an essential precondition for the construction of synthetic preventive imperatives. This is the case because the main constitutive element in the aspectual construal of preventive constructions is a statement about a highly probable state of affairs. The aspectual and temporal construal yields a future interpretation, and most Slavic languages use the present tense forms of perfective verbs for the synthetic expression of future tense. For Bulgarian, this option does not apply. Perfective verbs cannot express future as tensed predicates in the main clause because they are fully integrated in the analytic construction containing a future auxiliary.

To sum up, the phenomenon of aspectual coercion in Bulgarian negative imperatives results from the properties of the system of verbal categories, and especially from the strong analytic tendencies in its morphological organisation. Bulgarian emphasises the imperfective side of the aspectual opposition which, channelled through the cline of ATM categories,¹⁰ ultimately restrains the perfective verbs from expressing finiteness. Given these typological peculiarities, the motivation for the aspectual coercion in Bulgarian negative imperatives is straightforward.

6. Acknowledgements

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¹⁰ A comprehensive account of Leiss' ATM-Generalisation and related theoretical notions is given in the introduction to the present volume by W. Abraham and E. Leiss.

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Acquisition of negative imperatives in Bulgarian – Implications for verbal aspect

1. Introduction¹

Bulgarian is a Slavic language which overtly expresses highly complex aspectual and temporal relations. Bulgarian features the Slavic type of morphologically marked verbal aspect represented in the paradigms of perfective and imperfective verbs. In contrast to other Slavic languages, Bulgarian has preserved an exceptionally rich tense system². Temporal (un)boundedness is encoded in the opposition between Aorist and Imperfect as well as within the paradigm of the resultative tenses between Perfect and Past Perfect.

An important property of Bulgarian is the emphasis on the imperfective pole of aspectual categorisation. While some languages concentrate on the overt marking of perfective meanings like telicity and boundedness, the system of tense, aspect and modality (TAM) in Bulgarian upholds the equilibrium between the morpho-syntactic means expressing perfective and imperfective viewpoints. At the level of verbal aspect, the derivation of imperfective counterparts from perfective verbs known as imperfectivisation has achieved the highest degree of application among the Slavic languages. In Bulgarian, every perfective verb, be it simple or derived, has an imperfective counterpart forming a true aspectual pair. Imperfectivised verbs preserve the boundedness of the perfective counterparts and their syntactic properties, but shift the viewpoint to the event. As a result, imperfectivised verbs express ongoing processes while indicating their potential boundaries³.

Given the richness of aspectual morphological forms overtly marking the relevant aspectual features and their specific combinations, questions about the time course of their acquisition by children acquiring Bulgarian as a native language come to the fore. In this study we want to shed light on the acquisition of forms and functions of imperfective morphology at the level of verbal aspect, which is understood as a predication frame including the verb and its arguments. We will argue that target-like use of imperfective morphology reflects the ability to

¹ I'm grateful to Emmanuelle Labeau and two anonymous reviewers for their suggestions and insightful comments on an earlier version of the paper.

² Bulgarian grammar books identify 9 tenses (possible with both aspects), 3 of which are expressed synthetically and 6 analytically. See Bojadzhiev *et al.* (1999) for a systematic description. For a brief comparison with the tense systems of the other Slavic languages, see Sussex & Cubberley (2006:242ff.).

³ In Bulgarian, imperfectivisation is a grammaticalised means for the expression of historical present. See S.Guentcheva's (1981) interval-based explanation for the retained processual meaning and the actual present uses of imperfectivised verbs of different derivational types.

establish an internal viewpoint to telic eventualities. Investigating different types of situation descriptions, we show that the acquisition of finer perspective shifts required in two-states achievement verbs present the children with some challenges up to the age of five.

In order to abstract away from temporal boundedness associated with past tenses, we conducted an experimental study on the acquisition of negative imperatives in Bulgarian. Negative imperatives present an excellent testing ground for testing developmental hypotheses on two basic assumptions. Imperatives are among the constructions acquired early by children. Essential for the articulation of requests as one of the basic communicative functions, imperatives are less complex forms with respect to the number and complexity of verbal categories they express. The second assumption is based on a language specific property of Bulgarian negative imperatives which is relevant to the study of imperfective markers. Bulgarian features negative imperative constructions (NI) with a genuine verbal imperative inflection which is grammatical only with imperfective verbs⁴. Negative imperatives present a case of morphologically overt aspectual coercion (Moens & Steedman 1988), due to the morpho-syntactic properties of the Bulgarian TAM system which puts emphasis on the overt expression of imperfectivity.

The present experimental study on the acquisition of negative imperatives investigates how Bulgarian children combine elements of modality, negation and situation description in order to arrive at the target aspectual interpretation. The production data also allows inferences about-age related changes of children's ability to look at the internal structure of eventualities and to mark the perspective they take using the language-specific means. While children successfully master different facets of deontic modality employing various syntactic constructions, they still show some deviation from adult speakers with respect to the representation and overt marking of an inner perspective to a telic situation. The results obtained are discussed with respect to current research on the acquisition of imperfective aspect.

2. What is in a Bulgarian negative imperative ?

According to traditional definitions (Lyons 1977: 792) deontic modality represents a specific relation between speaker and addressee in which the speaker is in a position of authority and thus able to impose requirements on the addressee and to expect that these are fulfilled by the addressee. Bulgarian expresses deontic modality synthetically by means of verbal imperative

⁴ The absolute ungrammaticality of synthetic NI with perfective verbs in Bulgarian is employed as a test for the aspectual value of a verb (Bojadzhiev et al. 1999:490). In other Slavic languages, the aspect of the verb produces two different interpretations of NI – a prohibitive one with imperfective verbs and a preventive one with perfective verbs (cf. Chrakovskij & Volodin 1986).

inflection (1), or analytically in constructions containing modal elements, be they modal verbs, adverbs, or particles (2).

(1) Nalej sok v kanata !

Pour_{2SG PF IMP} juice_{M SG INDEF} into jug_{F SG DEF}

Pour some juice into the jug !

(2) a. Da nalee sok v kanata !

That_{MOD PARTICLE} pour_{3SG PRES PF} juice_{M SG INDEF} into jug_{F SG DEF}

Let (her / him) pour juice into the jug !

b. Da ne nalee sok v kanata !

That_{MOD PARTICLE} not pour_{3SG PRES PF} juice_{M SG INDEF} into jug_{F SG DEF}

She / He should not pour juice into the jug !

As example (2a) shows, Bulgarian has analytic imperative constructions with present tense verb forms and the particle *da*⁵. They exhibit full paradigms, including forms for 1st and 3rd person singular and plural. Due to their syntactic form in which negation follows the mood marker *da*, and therefore does not take scope over modality, negative analytic imperatives are possible with both verbal aspects (2b). In the following, we will concentrate on the synthetic imperative forms which exhibit specific morpho-syntactic features relevant to the study of imperfectivity.

The synthetic expression of imperative mood follows a general pattern which holds for all South Slavic languages (Sussex & Cubberley 2006: 299f.). The verbal stem consisting of the verbal root and aspectual affixes carries the imperative inflexion (often a thematic vowel) and may receive a plural marker (3b). Imperatives are immanently oriented towards an addressee and therefore not compatible with flexives marking person agreement with grammatical subjects.

The following examples illustrate the derivation of imperative verb forms by means of the imperative inflection *-i* /*-j* combining with consonantal (3a) and vocalic stems (3b), respectively.

(3) a. *pusn*_{stem PF} -*a*_{1SG PRES IND} - *pusn*_{stem PF} -*i*_{2SG IMP}

‘to drop – drop !’

b. *nale*_{stem PF} -*ja*_{1SG PRES IND} - *nale*_{stem PF} -*j*_{2SG IMP} (-*te*_{2PL})

‘to pour – pour !’

⁵ The multi-functional particle *da*, which is formally equivalent to the consecutive conjunction ‘that’, expresses imperative force.

Based on the peculiarities of the speaker-oriented mood (Bybee and Fleischmann 1995: 5), the temporal interpretation of an eventuality verbalised in an imperative expression oscillates between present and future readings. On the one hand, imperatives are immanently prospective (cf. Palmer 1986: 112) because they establish a directive concerning a future activity or a state of affairs to be set up by the addressee (addressee's perspective). On the other hand, imperatives obtain a present meaning if we take into account that the obligation they express is valid at the moment of speaking (speaker's perspective). Therefore, synthetic imperatives are not compatible with tense markers and may be categorised as verbal forms which are less complex with respect to the set of morphological categories they express (Donhauser 1987). Imperative forms carry aspectual information, but abstract from a clear-cut temporal assignment of the event. In sum, synthetic imperatives constitute a suitable testing ground for a language acquisition study targeting the effects of aspectually sensitive sentential operators on the aspectual interpretation and its formal expression.

2.1. Aspectual interpretation of negative imperatives in Bulgarian

The aspectual interpretation of negative imperatives in Bulgarian proposed in this paper follows the cognitive framework of Klein (1994) and related approaches. Bulgarian synthetic negative imperatives constitute an example of aspectual coercion with an overt morphological reflex. The term aspectual coercion will be used in the sense of Moens & Steedman (1988). Aspectual coercion is defined by the authors as an aspectual type-shift operation induced by a sentential modifier. Whether the coercion takes place covertly or overtly by prompting specific morphological markers depends on the morpho-syntactic properties of a given language (Moens & Steedman 1988: 20).

- (4) The girl won the school chess championship.
- (5) The girl won the school chess championship for several years.
- (6) * The girl won the chess match for the first few minutes.
- (7) The girl was winning the chess match for the first minutes, but then she made a wrong move.

A conspicuous example of covert aspectual coercion is the iterative interpretation of a core sentence containing a punctual verb and a singular object in the presence of a durational adverb as in (5). In the absence of sentential operators the core sentence (4) receives a single instance reading, but the aspectual features of the durational adverb invoke a repetitive reading – iteration of the action within the time span given by the adverbial.

In English, the proposition in (4) denotes a culminated process, in the terminology of Moens & Steedman. The girl has achieved a change from a preparatory state in which a chess match is still going on, and she is only a potential winner to a resulting state in which she has captured the opponent's king. According to the Vendlerian classification (Vendler 1967), the situation of winning a chess match is an achievement – the capture of the opponent's king instantiates a momentary change in the state of affairs. The presence of an adverbial phrase referring to a time span situated in the preparatory state before the culmination has been reached, as in (6), hardly makes any sense because of the aspectual clash between the terminative meaning of the verbal phrase and the durational meaning of the *for*-phrase. The syntactic environment induces a reinterpretation of the proposition as referring to a process (be winning a chess game), but it becomes felicitous only in the presence of a progressive auxiliary and the *ing*-infinitive. English handles propositions expressing processes and progressive states by marking them overtly by means of progressive auxiliaries (7).

The presence of aspectually sensitive sentential operators does not transform the inherent propositional content – winning a chess match still depicts an eventuality involving a change of state. What has changed is the way of looking at the internal structure of the eventuality concentrating on the source state. As Smith (1991: 63; 176) notices, languages may differ with respect to the temporal schemas of eventualities. If the temporal schema of achievements includes a preliminary stage, then an imperfective viewpoint is possible.

In the following, the aspectual construal of imperative utterances will be depicted within the cognitive approach of time categorisation in the language of Klein (1994) which is principally compatible with the approach of Moens & Steedman (1988), both theories adopting Reichenbach's notion of point of reference (Reichenbach 1947: 288ff.). The notion of topic time is crucial for Klein's approach to temporality. Topic time is not simply an orientation point, but a time span which confines a truth commitment of the speaker to the propositional content (Klein 1994: 3f.). This specific combination of a time span and truth assertion is essential for the definition of aspect. Topic time is the lens through which the speaker looks at the duration of the situation and its internal structure. Depending on the relations of inclusion or exclusion between Topic time and Situation time, different aspectual values are yielded. Perfectivity means a full or partial inclusion of the situation stretch in the topic time, which is perceived as an external perspective on the eventuality. The opposite constellation – inclusion of Topic time in the time span of the situation – effects an internal perspective typically conveyed by imperfective verbs. Topic time as the main reference frame is the pivot mediating between the main temporal notions grammaticalised as tense and aspect. Tense represents the positional relation between topic time and the time of utterance, while aspect locates topic time on the internal structure of the situation stretch.

Imperatives do not feature a genuine Topic time confining a truth claim. Instead, they contain a reference time span constraining an obligation. Obligation time (OT) includes the time of speaking because the demand is valid at the moment the imperative is uttered. According to this criterion, imperatives may be perceived as present forms. In contrast to this temporal interpretation, the prototypical imperative utterance exhibits an inherently prospective meaning because it refers to states of affairs which follow from activities carried out by the addressee⁶. Consider the aspectual configuration given in (8), which is a Bulgarian positive imperative containing a perfective verb.

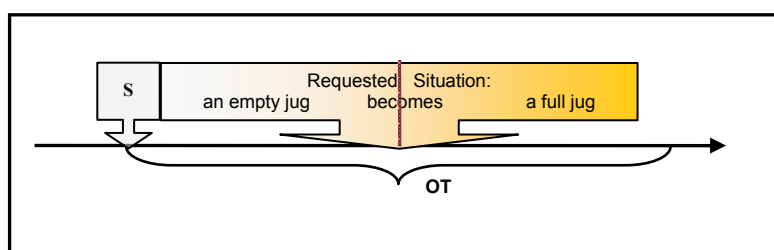
(8) *Sipi soka v kanata !*

pour 2SG IMP PF *juice* M SG DEF *into jug* F SG DEF

Pour the juice into the jug⁷ !

On the lexical level, perfective verbs depict situations which express a qualitative change of state, a transitional process or a punctual change from a source state to a target state. Perfective verbs focus the reference time span on the attainment of the target state. The use of a perfective verb in an imperative utterance endorses the deontic meaning, as both emphasise the completeness of the requested situation. As illustrated in Figure 1, the target state is included in the time span confining the obligation. The inherent prospectivity of the imperative aligns with the prospective meaning of the formally present tense perfective verbs. The sequencing of the source and the target state on the time axis produces a distance relation between the time of speaking and the target state, which triggers a prospective interpretation.

Figure 1. Aspectual construal of a positive imperative with a perfective verb



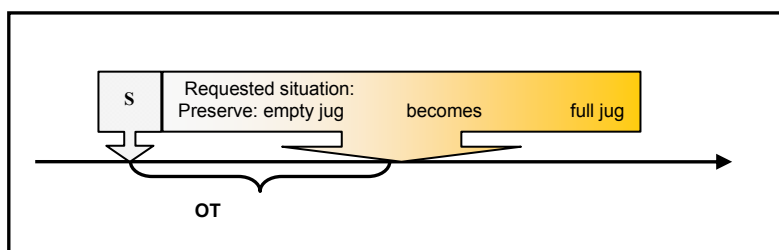
In imperatives, negation usually operates on the propositional content, directly influencing the aspectual construal. In the case of Bulgarian synthetic imperatives, negation applies to a tenseless predicate marked only for aspect and number. Negation affects the perfective

⁶ There are also positive imperative utterances demanding that the existing situation is preserved. In the next section it will be argued that negative imperatives belong to the type [-change]. Compare also Birjulin's (1994:48-60) classification of imperatives according to the feature [+/- required change of the existing situation.]

⁷ Note that Bulgarian encodes nominal definiteness by means of enclitic definite articles. In the given example, the bare noun *sok* would acquire a type reading as in (1); the use of the definite article *-a* in *soka* "the juice" marks a specific quantity of juice.

interpretation of the predicate by denying the anticipated change of state expressed by perfective verbs. The spotlight of the verbal reference time span moves from the target state back to the source state (cf. Figure 2). As pointed out by Klein (1994) and in similar vein by Rothstein (2004), the lexical content of the predicate is preserved. The inherent temporal structure of the denied situation does not change – pouring the juice into the jug remains a telic event. What changes is the way the speaker projects the reference interval onto the temporal schema of the eventuality or onto associated preparatory states.

Figure 2. Aspectual interpretation of a negative imperative



In utterance (9) the speaker wants the addressee to preserve the initial state of affairs, namely to leave the jug empty. The reference time of the imperative (OT) is included in the situation time, yielding an imperfective interpretation. Under negation, we obtain a combination of temporal values known as imperfective present – both the time of speaking and the source state of the situation denoted by the verb are included in the reference time of the obligation.

In Bulgarian, the change of the viewpoint appears in the guise of morphologically overt aspectual coercion instantiated by the obligatory use of imperfective verbs (10). A negative imperative utterance containing a perfective verb (9) violates the morpho-syntactic requirement of an overt marking in the case that the reference time is included in the time stretch of the situation.

(9) * Ne sipi soka v kanata.

Not * pour_{2SG IMP PF} juice_{N SG DEF} into jug_{F DEF}

Don't pour the juice into the jug !

(10) Ne sipvaj soka v kanata.

Not pour_{2SG IMP IMPF} juice_{N SG DEF} into jug_{F DEF}

Don't pour the juice into the jug !

In Slavic languages, the present tense form of perfective verbs does not convey the meaning of actual present. When used as predicates in main clauses, bare perfectives express future tense, which is their regular temporal function. This is not the case in Bulgarian, where future tense is expressed analytically by a future auxiliary. The use of the future auxiliary is equally

obligatory with perfective and imperfective verbs. Therefore in Bulgarian, there are no negative synthetic imperatives with perfective verbs, which are regularly employed in preventive utterances by speakers of the West and East Slavic languages (Kuehnast 2008) ⁸.

2.2. Imperfective morphology, imperfectivisation and aspectual pairs

Bulgarian verbs offer intricate ways of depicting and viewing the internal temporal constitution of events. Perfective aspect is encoded by means of perfective prefixes and one suffix, while imperfective aspect is marked by imperfective suffixes. Both aspects can also be expressed by non-derived verbs, primary perfectives and imperfectives. There is an ongoing discussion of the nature of Slavic type aspect, mainly on the question of whether the morphological paradigms of perfective and imperfective verbs indeed represent viewpoint aspect (cf. Smith, 1991, for a discussion of Russian aspect) or whether real aspectual distinctions are encoded consistently only for the past tenses (Bertinetto 2001). In Slavic aspectology, the debate revolves around the distinction between purely aspectual affixes, which alter the aspectual value of the verb without changing its lexical meaning, and derivational affixes, which combine derivational and grammatical functions.

For the purposes of the present study we will concentrate on imperfective suffixes and the process of imperfectivisation in Bulgarian. Imperfective verbs derived by means of imperfective suffixes do not differ from their perfective counterparts in lexical content, but only in aspectual value (Maslov 1981, Bojadziev et al. 1999). Therefore, imperfectivisation is understood as a grammatical process. Imperfectivisation is a means of viewpoint change and is operative in the aspectual systems of all Slavic languages. Nevertheless, there are differences in the degree of application and in the grammatical functions of the resulting imperfective verbs (Ivančev 1978).

Imperfective derivation by means of imperfective suffixes applies to almost all perfective verbs in Bulgarian. Primary imperfectivisation applies to simple perfective verbs. Secondary imperfectivisation applies to derived perfective verbs⁹. Perfective verbs derived from simple imperfectives through prefixation maintain the prefixed stem (11). Perfective verbs derived by means of perfective suffixes such as *-n* receive the imperfective suffix after stripping the perfective one (12).

⁸ In the cited paper I argue that the unavailability of perfective synthetic NI is due to the impoverished temporal functions of bare perfective verbs and also to the basic principle in the organisation of the TAM system of Bulgarian concerning overtly differentiated and precise form to function mappings. For a different approach see D. Levinson (2005), who relates the phenomenon of NI to properties of nominal case. Thanks to an anonymous reviewer for drawing my attention to Levinson's work.

⁹ Not all Slavic languages apply secondary imperfectivisation to a similar degree. For instance in Russian, a secondary imperfective is not available for verbs derived by means of purely aspectual prefixes. This fact is used to prove the derivation of true aspectual pairs. In Bulgarian, secondary imperfectivisation always applies, if not barred on phonological grounds.

(11) *lepja* _{primary IMPF} – *zalepja* _{prefixed PF} – *zalepvam* _{secondary IMPF} ‘to glue’

(12) *lepja* _{primary IMPF} – *lepna* _{suffixed PF} – *lepvam* _{secondary IMPF} - semelfactive meaning

There are two imperfective suffixes. Suffix *-va* represents a highly productive pattern and has reached the status of inflectional morpheme as convincingly argued for by Manova (2004). The author considers several criteria discussed in the field of morphology research as relevant for the distinction between derivation and inflection. Evaluated against such decisive factors as preservation of word class, productivity, and consistent assignment of inflexion class, the main imperfectivisation device in Bulgarian, the suffix *-va*, ought to be situated on the inflection side of the continuum between derivation and inflection. Manova (2004: 249) concludes that “in order to underline the inflectional status of imperfectivization, Bulgarian has developed a full set of aspectual forms”.

The non-productive suffix *-a*, mostly in combination with stem changes, constitutes a minor imperfectivisation pattern. At present, it is under levelling pressure and loses verbs to the productive paradigm.

3. Empirical investigation

Studies in the acquisition of verbal categories by children acquiring Slavic languages have shown that the children are able to produce tense and aspect morphology quite early. R. Weist and his colleagues (Weist et al. 1991; Weist et al. 1984) presented evidence that children acquiring Polish produce past tense inflections and are able to use them not only with telic but also with atelic predicates even before the age of 2. Similar findings are reported for the acquisition of Russian by Gagarina (2000) and Bar-Shalom (2002). Bar-Shalom presents evidence that the 4 children she investigated (1;6 - 2;11) produced verbs in all 3 Russian tenses and aspectual pairs quite appropriately. There were almost no errors in the use of perfective morphology.

With respect to the time course of acquisition, a similar result is obtained from the naturalistic data of two Bulgarian girls (Kuehnast, Popova & Popov 2004; Bittner et al. 2005). However, the tense system of Bulgarian allows for a more differentiated look at the acquisition course of tense markers regarding their functions in the construal of perfective and imperfective meanings. While the Bulgarian children (1;1 - 2;5) were similarly quick to use perfective and imperfective verbs in Aorist, Perfect and Future, they produced very few tokens of verbs inflected for Imperfect tense, and only at the end of the investigated period.

The low number of Imperfect tense verbs in the production of both girls contrasts with the productive use of synthetic (Aorist) and analytic (Future and Perfect) tenses which are more strongly associated with the expression of bounded intervals. From the distribution of produced

verbs we may infer that Bulgarian children experience more difficulties with a tense form which expresses an imperfective view of eventualities anterior to the moment of speaking. This position is supported by findings from comprehension and production studies (Kazanina & Phillips 2007, on Russian; van Hout 2005, on Polish) which show that children's understanding of imperfective past tense utterances deviates to some extent from adult interpretation.

The present cross-sectional investigation concentrates on the acquisition of negative imperatives as these require the representation of an abstract, counterfactual situation model and the overt marking of an internal perspective to the situation structure. Based on evidence that children's understanding of imperfective utterances is based on the representation of ongoing situations (Vinnitskaya & Wechsler 2001, Weist et al. 1991), we assume that Bulgarian children will produce the targeted NI more successfully if the coerced interpretation yields an imperfective verb denoting an atelic activity. Although adult Bulgarian speakers handle the imperfective paradox with ease, we hypothesise that children's production of target imperfective verbs, which simultaneously express ongoingness and telicity will be hampered by the intricate representation and the morphological complexities associated with it.

3.1. Experimental method

We conducted a production study with a cross-sectional design using an elicitation task. The idea behind the experiment was to trace the developmental steps in the acquisition of secondary imperfectivisation with respect to form and function related factors.

Participants: A total of 40 monolingual, normally developing children participated in the experiment. As indicated in Table 1 they were divided into 2 age groups. The children were tested in their kindergarten in Vidin, Bulgaria.

Table 1. Age groups

| AGE GROUP | MEAN AGE | AGE BRACKET | NUMBER |
|-----------|----------|-------------|--------|
| 1 | 3;4 | 2;11 - 3;11 | 15 |
| 2 | 4;5 | 4;0 - 5;0 | 25 |

3.2. Design and materials

We performed an elicitation task. The experimenter produces positive synthetic imperative utterances, asking a puppet to carry out an action. The prompt sentences always contain a perfective verb. For the child to respond to the task correctly, he / she produces a negative imperative with an imperfective verb (see section 3.3. for a description of the procedure).

We selected 16 verbs which represent 3 types of perfective derivation: 4 simple perfective verbs, 6 suffixed and 6 prefixed verbs.

Table 2. Combination of morphological factors

| PERFECTIVE DERIVATION | IMPERFECTIVATION PATTERN | |
|-----------------------|--|--|
| | Productive: suffix <i>-va</i> | Minor: suffix <i>-a</i> / stem change |
| Simple | stāpja _{pf} – stypvam _{impf} 'to step' | skocha _{pf} – skacham _{impf} 'to spring' |
| Prefixed | nadraskam – nadraskvam _{sec. impf} 'to scribble over completely' | procheta – prochitam _{sec. impf} 'to read through' |
| Suffixed (-n) | ritna _{pf} – ritam _{impf} – ritvam _{sec. impf} 'kick' | blāsna _{pf} – blāskam _{impf} 'to shove' |

Half of the verbs belong to the productive imperfectivisation pattern (suffix *-va*), the other half belong to the minor imperfectivisation pattern (suffix *-a* and stem vowel change). Table 2 shows examples of morphological factors which are expected to affect the process of overt aspectual coercion in production.

There is a relatively high correlation between types of perfective derivation and situation description (see Table 3). The selected simple perfective verbs can be reasonably understood to denote a punctual change of state, an achievement situation description. Simple perfectives are subject to (primary) imperfectivisation. The resulting imperfective verbs depict associated processes, which lead to the punctual culmination.

Table 3. Assignment of the perfective stimuli to event descriptions

| PERFECTIVE VERBS | EVENT DESCRIPTIONS | | |
|------------------|--------------------|-----------------|---------------|
| | Achievements | Accomplishments | Semelfactives |
| Simple | 4 | | |
| Suffixed | 2 | | 4 |
| Prefixed | 2 | 4 | |

The suffixed perfectives also describe punctual events, either as achievements or as semelfactives. In general, suffixed perfectives form an aspectual pair with the simple imperfective activity verbs. If the temporal configuration of imperfective present applies, the simple imperfective is used. Depending on the availability of a semelfactive interpretation, secondary imperfectivisation becomes morphologically available.

The selected prefixed verbs are accomplishments and achievements; the latter interpretation is due to the ingressive meaning of the prefix. Prefixed perfectives are subject to secondary imperfectivisation. Secondary imperfectivised verbs achieve the highest level of derivational complexity which reflects an intricate construal of aspectual meaning.

The verbs were selected from a corpus containing naturalistic spontaneous speech of 3 children, Alexandra (1;3 - 1;11), Stefani (1;1 - 2;4), and Bogomila (2;1 - 2;4). The usages of

the 16 verbs found in the data of the children substantiate the claim that all those verbs are acquired by Bulgarian children by the age of 3. Several studies have shown that age of acquisition is a reliable predictor of processing speed and accuracy in child and adult production and comprehension tasks (cf. Barry & Johnston 2006, Druks & Masterson 2000, Juhasz & Rayner 2003). In a recent study, J. Masterson and her colleagues (2008) discuss word frequency values based on different databases, e.g. frequency counts based on large corpora of adult speech or frequency counts based on children's books, and the difficulty of obtaining reliable child speech frequencies. They argue that although word frequency in adult language¹⁰ reflects input effects, and therefore has to be considered a significant factor in experimental studies of child language, age of acquisition appears to be a performance predictor of comparable strength and reliability.

3.3. Procedure

The children were tested in a quiet room in the kindergarten. The child and the two experimenters sat together at a table. The first experimenter introduced to the child a second experimenter who carried a glove puppet in the shape of a penguin. She explained that this was the penguin Toto who had come to Bulgaria from the South Pole. Toto is not familiar with the rules at the kindergarten. The experimenter explained that she was going to play some jokes on the penguin, asking Toto to do different things. The child was asked to reject the silly requests and tell the penguin not to carry them out, because such behaviour would be inappropriate in the kindergarten. The child was encouraged to address the penguin directly.

Figure 3. Elicitation task

| | |
|-------------|---|
| Situation: | The penguin Toto is holding a tissue handkerchief. He still doesn't know that he has to put it in the rubbish bin. |
| Silly exp.: | Toto, <i>pusni</i> _{2SG IMP PF} <i>kărpata na zemjata</i> Toto, drop the handkerchief on the floor! |
| Child: | Toto, <i>ne ja puskaj</i> _{2SG IMP IMPF} <i>na zemjata!</i> Toto, don't drop it on the floor. |

The procedure has the advantage of making the child direct prohibitive requests not to an adult person, but to a penguin puppet in a pragmatically well motivated situation. Stated in this way the task avoids potential problems with the authority cline between adults and children in a direct interaction.

¹⁰ To my knowledge, there is no sufficiently large corpus of Bulgarian which can be used for frequency counts at the moment.

Subjects received 2 or 3 training stimuli, and once they were able to understand the task, the experimental stimuli were given. The stimuli were written on cards and presented in random order. The sessions were audio recorded and subsequently transcribed.

4. Results and discussion

As valid answers we counted all negative requests, be they second person synthetic imperative forms or alternative analytic forms. We obtained a generally high response score of 98%. The valid answers contain 91.6% negative imperative forms and 8.4% other negative constructions. An one-way analysis of variance (ANOVA) reveals an age effect on the general task compliance ($F(1, 596) = 13.1, p < .001$) which increases from 87% to 95%.

4.1. The expression of force in negative imperatives

The production of synthetic NI is unproblematic and remains at a level of 80% in both age groups. With age the children produced more analytic NI which express a moderate request. When the children did not produce the required synthetic negative imperatives they opted for several types of negative utterances with pragmatically related meanings: elliptic utterances such as (13) and (14), 3rd person analytic negative constructions with the modal *da*-particle (15) or negative statements with future predicates (16). The alternative constructions emphasise different aspects in the modal and temporal interpretation of negative requests.

Table 4. Distribution of negative requests per age group

| NEGATIVE REQUESTS | AGE GROUP | |
|--------------------------------|-------------|-----------|
| | 2;11 - 3;11 | 4;0 - 5;0 |
| Synthetic NI | 80.2% | 81.5% |
| Analytic <i>nedej</i> -NI | 6.6 % | 13.0 % |
| Modal <i>da</i> -constructions | 3.3 % | 1.8 % |
| Elliptic utterances | 8.5 % | 2.3 % |
| Future predicates | 1.4 % | 1.3 % |

There are 3 types of short elliptical utterances (without lexical verbs) which express different degrees of obligation depending mainly on intonation and gestures and partly on the lexical means chosen. The imperative force used varies from prohibition expressed by the simple rejection “No !” and with proper intonation, to different degrees of permission expressed by simple negative modals (13) or constituent negation (14).

- (13) Exp: Toto, stăpi_{PF} na topkata !
Step on the ball !
Child(2;11): Ne mozhe !
This is not allowed !

- (14) Exp: Toto glătni_{PF} kopcheto !
Toto, swallow the button !
Child (2;11): Ne kopcheto_{N DEF} !
Not the button !
- (15) Exp: Toto, nadržaskaj_{PF} lista !
Toto, scribble over the page !
Child (4;02): Da ne nadržaskva_{3SG PRES IMPF} lista !
(He) should not scribble over the page !
- (16) Exp: Toto, skochi_{PF} dolu !
Toto, spring down !
Child (4;05): Njama da skochish_{2SG FUT PF} !
(You) will not spring !

The strategy to use elliptic utterances is not employed by the children in a homogeneous way. With age the number of elliptic utterances decreases, but remains an option. There is a qualitative difference based on the type of deontic necessity children want to express. Younger children try to avoid being a deontic source and opt for a weaker obligation ascribed to a general impossibility / inappropriateness of carrying out the action. They decide on elliptic modal constructions of the type “It's not allowed” (13). Older children prefer the brevity of prohibitive “No !” supported by appropriate intonation.

Only the youngest children (2;11) produced elliptic utterances with constituent negation. Such usages are remnants of an earlier developmental stage (around 2;6) in the acquisition of verbal aspect. At the beginning of productive use of perfective morphology the children still have to sort through the elements of lexical and grammatical aspectual meaning integrated in Bulgarian perfective verbs. It is characteristic of this stage that children often mark telic situations compositionally, on the level of the verb phrase. They combine an imperfective activity verb with a definite object and arrive at a telic interpretation through the specified quantity of the noun. (Kuehnast, Popova & Popov 2004). At this stage Bulgarian children seem to focus on the temporal schemes of the eventualities and their proper representation, exploring the different morpho-syntactic means provided by the target system. In the present case, the youngest subjects seem to reverse the principle. By means of constituent negation they deny the definite object, which measures out the event (in the sense of Verkuyl 1993) and arrive at an atelic interpretation akin to the imperfective viewpoint required in a negative imperative.

The remaining alternative constructions (15) and (16) impose an obligation on the addressee more or less directly. The rates of the more neutral 3rd person analytic da-constructions, which help to avoid addressing the interlocutor with a direct command remain

relatively stable. The use of periphrastic *da*-constructions becomes reinforced by the fact that they allow for perfective verbs. Such utterances are interpreted rather as warnings than as commands.

Children aged 4;7 - 5;0 do not avoid direct requests, producing 84% synthetic NI. The only analytic example with an embedded *da*-construction expresses the performative and the propositional part of the prohibitive separately (17).

- (17) Exp: Toto, priberi_{PF} igrachkite !
 Toto, collect the toys !
- Chi (4;7): Ne ti davam da gi pribirash_{2SG PRES IMPF} !
 I don't permit you to collect the toys !

In a few cases the subjects used statements with future predicates. The truth commitment contained in the tensed predicate expresses degrees of certainty that the denied situation will not be brought about which are comparable to those of the synthetic negative imperatives. With age, children feel more comfortable with the position of authority which is needed in order to impose on an interlocutor an obligation concerning a counterfactual situation. With respect to the end effect desired by the speaker, synthetic negative imperatives are quite subtle expressions. The request to the addressee to keep the present state of affairs is linguistically marked only through the imperfective form of the imperative predicate.

4.2. Aspectual issues: a form-related analysis

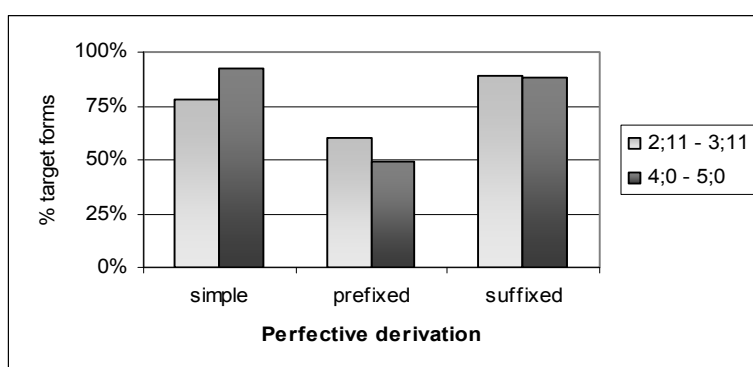
In the theoretical discussion, we argued that the temporal interpretation of a prohibitive utterance is best described as imperfective present. In Bulgarian, taking an imperfective perspective on an eventuality requires an overt expression by means of an imperfective verb form. The experimental data reveals high compliance with the aspectual requirement in the produced negative imperatives. With age the rates of imperfective verbs increase from 90% to 93% within the synthetic and analytic 2nd person negative imperative utterances. Quantitatively, there is no age effect, as the imperfectivisation rates are already high and increase linearly.

In order to detect age related changes in the way children deal with aspectual morphology in cases of aspectual coercion, we conducted a 2 x 3 x 2 way ANOVA analysis with the factors age group, perfective derivation and imperfectivisation pattern, on the production of imperfective versus perfective forms in synthetic negative imperatives. In this analysis, both target imperfective forms and erroneously imperfectivised forms were counted as valid responses; lexical substitutes were excluded from the analysis.

There is no main effect of imperfectivisation pattern, but a significant effect of perfective derivation ($F(2,514) = 4.984, p = .007$) on the imperfectivisation success. While imperfective counterparts of suffixed perfectives are highly accessible to the children (95%), imperfectivised forms of the simple (91%) and the prefixed perfectives (87%) are produced less frequently. There was no age effect, but we found a significant interaction between age group and derivation type ($F(2,514) = 3.232, p = .040$). The interaction is related to the increase of imperfective forms derived from primary perfectives in the production of the older children. The significant interaction between perfective derivation and imperfectivisation pattern ($F(2,514) = 6.577, p = .002$) is based mainly on the fact that simple perfective verbs are more accessible to imperfectivisation if they belong to the productive *va*-pattern, while the opposite patterns hold for prefixed verbs.

The significant interactions between perfective and imperfective aspectual markers and age group are analysed in more detail with respect to production rates of target forms. Figure 4 illustrates that suffixed perfectives are not only more accessible to an imperfective perspective in general, but that children produce the target imperfective verbs quite easily.

Figure 4. Production of target imperfective verbs in NI



Therefore, the following analysis considers only the performance on simple and prefixed perfectives. Verbs belonging to these two types have to undergo imperfectivisation. The results of the 2 x 2 x 2 way ANOVA with the factors perfective derivation, imperfectivisation pattern and age group on the production of target verb forms reveal a main effect of perfective derivation ($F(1,298) = 31.55, p < .001$), due to the low rates of secondary imperfectivised prefixed verbs. The significant interaction between perfective derivation and age group ($F(2,514) = 5.924, p < .016$) reflects developmental changes in the ability to imperfectivise simple perfectives. With age children considerably improve their performance with simple perfectives, approaching adult-like production, while their ability to produce secondary imperfectivised prefixed seemingly decreases. There was no main effect of imperfectivisation pattern on the production of target forms and no interaction with the other factors. This result

seems inconsistent with the finding that affiliation with the productive or with the minor imperfectivisation pattern has different effects on the overall probability that children will produce imperfective forms from simple and prefixed perfectives.

The puzzle can be resolved through a more detailed form-based error analysis. Bulgarian children in the first age bracket (2;11 - 3;11) already use the suffix *-va* productively (see analysis of longitudinal data in Kuehnast, Popova & Popov (2004). However, when they encounter irregular simple perfectives, they behave more conservatively. Regular prefixed perfectives are subject to prefix stripping. The members of the irregular imperfectivisation pattern are less readily available to prefix stripping and attract non-target applications of the *va*-suffix. As a result, they get inappropriate imperfective markers more frequently, while production rates of target forms stagnate.

Table 5. Age group (2;11-3;11) distribution of verb forms produced in NI

| IMPERFECTIVISATION PATTERN | Realisation | PERFECTIVE DERIVATION | |
|-------------------------------|-----------------------------------|-----------------------|----------|
| | | simple | prefixed |
| PRODUCTIVE <i>-va</i> | target imperfective form | 85.7% | 57.6% |
| | prefix stripping | | 21.2% |
| | perf (imperfectivisation failure) | 14.3% | 21.2% |
| | | | |
| MINOR <i>-a / stem change</i> | target imperfective form | 69.6% | 65.6% |
| | prefix stripping | | 3.1% |
| | add <i>-va</i> | 8.7% | 21.9% |
| | prefix stripping & add <i>-va</i> | | 6.3% |
| | perf (imperfectivisation failure) | 21.7% | 3.1% |

The overall correlation between imperfectivisation pattern and perfective derivation classes is preserved and enhanced in the production pattern of the older children. The small set of simple perfective verbs and the high frequency of their use provide acquisition advantages over the large-sized derivational families of prefixed perfectives.

Table 6. Age group (4;0-5;0) distribution of verb forms produced in NI

| IMPERFECTIVISATION PATTERN | Realisation | PERFECTIVE DERIVATION | |
|--------------------------------|--|-----------------------|----------|
| | | simple | prefixed |
| PRODUCTIVE: <i>-va</i> | target imperfective form | 95.2% | 56.7% |
| | prefix stripping | | 19.4% |
| | prefix stripping & add <i>-va</i> | | 14.9% |
| | perf verb (imperfectivisation failure) | 4.8% | 22.4% |
| | | | |
| MINOR: <i>-a / stem change</i> | target imperfective form | 89.1% | 51.4% |
| | add <i>-va</i> | 4.4% | 30.0% |
| | prefix stripping | | 10.0% |
| | perf verb (imperfectivisation failure) | 6.5% | 8.6% |

Older children who have had more time to become acquainted with the target aspectual system are highly sensitive to the imperfectivisation requirement in NI and tend to combine imperfectivisation strategies, sometimes producing hybrid imperfectivised forms (18) – (19).

- (18) Exp: Toto, nadraskaj prefixed PF masata !
 Toto, scribble over the desk !
 Child: Toto, ne ja * draskvaj IMPF: prefix stripping + suffix -va !
 Toto, don't scribble it over !
 target: nadraskvaj
- (19) Exp: Toto, izleti prefixed pf prez prozoretsa !
 Toto, fly away through the window !
 Child: Toto, ne *izlitvaj IMPF: stem change + suffix -va !
 Toto, don't fly away !
 target: izlitaj

The frequency of such usages effects that the overall imperfective marking of prefixed perfectives increases, but at the same time the rate of target imperfectivised forms remains low.

4.3. Meaning-related perspectives on the error analysis

The experimental data shows that the children produced negative imperatives with imperfective forms reliably. However, the error patterns obtained cannot be sufficiently accounted for only by considering the properties of the morphological paradigm. Productivity, transparency and frequency of usage exert a significant impact on the acquisition process of aspectual morphology. Nevertheless, the error analysis above demonstrates that children do not apply the productive imperfectivisation suffix in all cases. Which factors could possibly strengthen the preference of the younger children to apply prefix stripping to verbs of the productive class and not to the verbs of the minor class ? We want to propose that these factors are related to the interpretation of the prohibitive utterances in terms of the temporal schema expressed in the lexical item and its representation in the situation model.

A closer look at the experimental items which are available to prefix stripping reveals that these verbs correspond to accomplishment and achievement situation descriptions. The verbs from the productive imperfectivisation class denote accomplishments; the verbs from the minor class denote achievements. Prefix stripping yields the simple imperfective verb from which the perfective verb is derived. The basic imperfective verb depicts an atelic activity. In a negative imperative context, the application of prefix stripping to achievement and accomplishment predicates yields quite different results. The activity expressed by the

resulting simple imperfective is located either before (20) or after the negated change of state (21).

The irregular prefixed perfective verbs used in the experiment are derived by means of ingressive suffixes and depict achievement situations. The punctual change of state applies to the beginning of the activity denoted by the basic imperfective verb and situates this activity in the target state. In the case of prohibitive utterances containing an ingressive achievement predicate, prefix stripping yields an expression which does not fit the causality chain of the situation model. The use of the simple imperfective verb appears unfortunate as it depicts a situation referring to the subsequent activity (21). The fact that prefix stripping was used sporadically is due to the general-factual meaning of simple imperfective verbs – all phases of the action are included in the basic denotation. Vinnitskaya and Wexler (2001) found similar production behaviour in Russian children, who overused imperfective forms for situations in which adult speakers produced perfective verbs.

- (20) a. Morphological derivation pattern:
 draskam_{simple IMPF} – nadraskam_{prefixed PF} – nadraskvam_{sec. IMPF}
 ‘to scribble – to scribble sth. over – to be scribbling sth. over’
- b. Temporal chain:
 scribbling (source state) – object scribbled all over (target state)
- (21) a. Morphological derivation pattern:
 letja_{simple IMPF} – izletja_{prefixed PF} – izlitam_{sec. IMPF}
 ‘to fly – fly away – to be flying away’
- b. Temporal chain:
 starting to fly (source state) – flying activity (target state)

In the case of accomplishments predicates, the basic activity is situated at the source stretch of a corresponding 2-state perfective predicate (20). Children in both age groups regularly produced negative commands in which the predicate is imperfectivised by prefix stripping. In this way, they apply negation to an atelic situation description. The resulting form imposes on the addressee the requirement to refrain from an activity which is the source of the denied situation. In terms of pragmatic appropriateness, negative requests with simple imperfectives reliably provide the desired result because, without a source action, no resultant change of state can be obtained.

Nevertheless, the target form requires an imperfectivised prefixed verb. Secondary imperfectivisation shifts the perspective from the target state to the source state. Obligation time (OT) is included in the source state of the accomplishment situation. The resulting

interpretation is that the speaker does not request the listener to refrain from the atelic activity; only the attainment of the prospective change of state is rejected.

The production rates displayed in Tables 5 and 6 show that children are sensitive to the achievement / accomplishment distinction within the group of prefixed verbs. The rates of prefix stripping applied to accomplishment predicates remain stable, but with age the children apply the productive suffix more often in an attempt to produce the required secondary imperfectivised form.

The selected simple perfective verbs are isomorphic to descriptions of achievement situations. They build minimal pairs with their derived imperfective counterparts. Initially children (2;11 - 3;11) seem to experience some difficulties in applying imperfective perspective to a punctual change of state which is not associated with an atelic activity in the target language.

A relative high percentage of the produced NI contains perfective forms (Figure 4 and Table 5). In our view, this is due to the fact that the children are able to represent the state of affairs described by the interlocutor and to negate it. The required representation of the actual situation is not available in those cases. As indicated by the lack of imperfectivity markers, the children have not shifted their perspective back towards the time of speaking. Still, there is no coincidental relation between time of speaking, obligation time and a potential preliminary activity.

The production of imperfectivised target forms increases significantly with age and reaches the upper limit level similar to the correctness cores of the suffixed perfectives, which also represent punctual situation descriptions. As pointed out in the previous section, suffixed perfectives form aspectual pairs with the basic imperfective verbs. The simple imperfective partners are readily available even to the younger children when they are confronted with contexts of aspectual coercion. The obtained result allows the inference that the situation model underlying negative imperatives with this kind of predicates is the point of departure for the children on their way to adult interpretation of prohibitive utterances.

As convincingly argued by Rothstein (2004:185ff.), semelfactives represent minimal activity events. They have internal structure, a starting point, perhaps trajectory and an endpoint. In Bulgarian the suffix *-n*, traditionally called the semelfactive suffix, is used to derive a single instantiation of an activity. The fast acquisition of suffix *-n* is taken as evidence that shifting between a holistic and an internal perspective towards a minimal activity event is achieved early by the children acquiring Bulgarian. A negative request containing a semelfactive verb is interpreted as an obligation to restrain from the minimal activity.

The hypothesis that children may adopt the mechanism of negating the associated activity for other types of situation descriptions is supported by the data. The analysis of the

morphological techniques applied by the children demonstrates that the target imperfectivised forms are achieved faster with semelfactives and achievements as their negation naturally involves denial of the related activity. This pattern is enhanced through the representation of causality relations, long known to be central to the acquisition of negation (Volterra & Antinucci 1979; Bates, Camaioni & Volterra 1979).

The proposed line of reasoning gains additional support from a special type of error found in the data. In 4% of the responses, children produced verbs differing from the perfective prompts. In all cases the alternative verbs are imperfective. They are either related to possible processes situated in the pre-time time of the described situation (22) or are synonymous with the given verb.

There is an age related difference with respect to the use of alternative verbs ($\chi^2=9.899$ $p<0.002$). The younger children (2;11 - 3;11) produced more verbs (82%) denoting potential eventualities which are in a temporal or causal relation to the prohibited state of affairs.

- (22) Exp: Toto, natisni_{PF} kopcheto !
 Toto, press the button !
 Chi: Toto, ne go pipaj_{IMPF} !
 Toto, don't touch it !

In the remaining cases, the children concentrated on the associated activity for which primary imperfective verbs are available. For instance, the verb *blysna* 'shove away' was replaced by the synonymous verb *butam* 'to push continuously'. The older children (4;0 - 5;0) opted for verbs which represent a synonymous description of the situation (89%), depending on the subjective perception of the action, e.g. stepping on the ball was characterised by two children as a process of lacing oneself on the ball, either sitting or standing.

The representation of the situation expressed in a negative imperative involves several elements: the assumption that the addressee is going to carry out the negated situation, the attempt to prevent him or her from doing so by uttering a request, the representation of the state of affairs to be kept unchanged and the representation and marking of the proper viewpoint through the selected verbal frame. The last step seems to pose some problems to Bulgarian children aged 5 and younger. When dealing with accomplishment predicates they still rely on causality relations between parts of the simulated situation model and often fail to take an internal perspective with respect to the source state. Applying an imperfective viewpoint to an accomplishment situation description presents a challenge to children acquiring the aspectual system in Bulgarian.

5. Summary and conclusion

In communicative situations children, like adults, simulate the state of affairs they talk about in a situational model which is grounded in perception and experience (Kaup, Lüdtko, & Zwaan 2006). An important part of the simulation is the way the speaker looks at differently structured situation types. The means the speakers have at their disposal in order to express such viewpoints differ with respect to the TAM categories specific to the language in question. Negative utterances, which include the representation of a counterfactual state of affairs are of special interest because they involve a higher level of abstraction with respect to the internal structure of the depicted eventualities.

Based on these assumptions we conducted an experimental study on the acquisition of negative imperatives by 3 to 5 year-old Bulgarian children. The morpho-syntactic properties of the tenseless imperative predicates offer the opportunity to look more closely at processes of aspectual construal. The experimental study provides evidence that Bulgarian children are sensitive to different aspects concerning the performative and the propositional elements of negative imperative utterances. With age, children feel more comfortable with the expression of force and are able to produce the synthetic negative imperatives required in the experimental task.

Synthetic negative imperative constructions were selected as targets of the elicitation task because they present a context in which imperfective verb forms are mandatory. While positive requests are well-formed with perfective and imperfective verbs, only imperfective verbs are grammatical in negative imperative utterances. We argue that the predicate of a negative imperative is subjected to overt aspectual coercion. Negation affects the aspectual value of the predicate, yielding a temporal configuration of imperfective present which triggers an imperfectivisation requirement in Bulgarian.

The main goal of the study was to explore developmental stages with respect to the acquisition of imperfective viewpoints on telic situation descriptions and the employment of imperfective morphology. For this purpose we tested relatively homogenous age groups and were able to discover age-related changes in the way children cope with different shapes of the imperfective paradox.

The results we obtained show significant effects of morphological complexity on the production of imperfective verbs in terms of perfective derivation and affiliation to the productive imperfectivisation pattern. While the children approached adult-like performance in producing the imperfective counterparts of simple and suffixed perfective verbs (over 75% correct), they were considerably less successful in producing secondary imperfectivised forms from prefixed perfective verbs up to the end of the investigated age bracket (2;11 - 5;0).

The error analysis presents evidence that Bulgarian children do not always interpret the temporal configuration of negative imperatives the way adults do. Younger children achieve best performance with suffixed perfectives that predominantly depict semelfactive events, and they also show quick improvement with simple perfectives denoting achievements.

When children are confronted with requests concerning punctual events they simulate a one-stage situation. Applying negation to one-state situation descriptions means to reject associated activities placed in the pre-time of the potential punctual state. By rejecting the realisation of prerequisite activity, children make sure that the state of affairs will not be brought about. The causality chain of the situation model is in perfect agreement with the target aspectual interpretation, which involves shifting the time stretch of obligation into the pre-time of the punctual event.

The error type of prefix stripping was found to be relatively robust suggesting that children tend to generalise the causality-related interpretation to negative imperatives with accomplishment predicates in which the proper imperfective perspective on the internal structure of the situation does not coincide with the causality chain. A secondary imperfectivised verb indicates that the obligation is located within the source state of the accomplishment situation description. The aspectual configuration is understood as expressing an imperfective view on a telic situation. In our data children often opted for the simple imperfective verb, thus rejecting the activity of the source state. In such cases, the children preserved the view of the accomplishment as an ‘indivisible whole’ (Comrie 1976) encoded in the prefixed perfective stem and did not zoom in on the internal temporal structure of the event.

The obtained results fit well in the ‘perspective-based’ approach to the acquisition of imperfective aspect, which is grounded in studies exploring the acquisition of perfective and imperfective past tense meaning to form mappings. Knowledge of the perfective / imperfective contrast is associated with the ability of the children to vary their perspective towards the event. Other lines of reasoning (i.e. lack of pragmatic knowledge restricting the use of past imperfectives as in Vinnitskaya & Wexler (2001) or problems with discourse integration as in van Hout (2005)) also draw on past tense experiments. The complex interrelations of tense and aspect in past tense utterances and the different discourse-related readings such utterances may obtain, make it difficult to disentangle the effects of these factors on the acquisition of imperfectivity as aspectual notion.

The current experiment abstracts away from the discussion revolving around the imperfective past tense uses and the associated failure / success of temporal linking to other past events (van Hout 2005; Kazanina & Phillips 2007). The experimental method targets the ability of a child to map his / her ‘here and now’ viewpoint onto the internal structure of the

event. The main findings support the view that young children acquire perspective shifting only gradually. The significant correlation between appropriate uses of imperfective morphology and verb types found in the production data indicates that the conceptual similarities between the properties of some situation descriptions and the characteristics of an event internal perspective boosts the acquisition of imperfective aspect.

Although they are successful in imperfectivising primary and suffixed perfective verbs, Bulgarian children experience difficulties when they have to shift their perspective to the source state of a two-state predicate and to mark this shift appropriately up to the age of 5. The experimental data based on the production of coerced imperfective negative imperatives provides evidence that 3 to 5-year-old Bulgarian children are still on their way to acquire all facets of imperfective aspect available in the TAM system of Bulgarian.

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Processing negation and aspect in Bulgarian – Evidence from normal and agrammatic sentence comprehension

Abstract

Bulgarian negative imperative sentences which are grammatical with imperfective verbs but ungrammatical with perfective verbs, provide an excellent opportunity to examine the correlation between negation and verbal aspect as functional items in terms of language processing. The aspectual system provides aspectual minimal pairs which contrast the functional information of the verb and its morphological encoding, while keeping the lexical information constant.

A self-paced reading task and a comprehension test with normal and agrammatic persons were carried out to approach their real-time comprehension of negative imperatives. While reading times reflect sensitivity to checking requirements in the course of structure building, answer scores to Yes/No questions demonstrate the ability for semantic interpretation of the obtained syntactic representation.

The experimental data of the agrammatic and control groups exhibit similar processing patterns which reflect sensitivity to verbal aspect and aspectual morphology in the syntactically relevant context of negative imperatives.

1. Verbal Aspect in Bulgarian

In the last few decades research in language typology (Comrie, B. 1976, Dahl, Ö. 1985; 2000) has shown that despite differences and idiosyncrasies languages are bound to express aspectual distinctions and have grammaticalized means for that purpose. The global aspectual properties of clauses arise as a result of the interaction of many factors such as argument structure, Aktionsart of the verb, aspectual morphology and tense forms.

Slavic languages express verbal Aspect in the opposition perfective/imperfective manifested in morphologically linked pairs of verbs. The morphological relationship between the members of an aspectual pair is commonly viewed as derivational, but there are also several arguments against the derivational nature of aspectual morphology in Slavic. According to Dahl (1985:85) Slavic aspectual oppositions are typologically unusual: they behave more like inflectional than like derivational categories, e.g. being sensitive to discourse phenomena such as foregrounding and backgrounding. Slavic aspect is expressed not only in past tense forms but also in present and future tenses and in non-finite forms such as infinitives and imperatives. In this way it is less dependent on tense and time references than the aspectual oppositions in other languages.

Among the Slavic languages Bulgarian has often been described as the language with the most grammaticalized aspectual system due to a productive and almost non-defective aspectual derivation. As in all other Slavic languages, deriving aspectual pairs in Bulgarian involves

prefixal and suffixal formants. A brief description of the two main types of aspectual morphology is presented below.

1. Perfectivizing prefixation is used to derive a perfective counterpart of a simple imperfective verb like *pija* IMPF - *izpija* PF (drink-drink up), where the perfectivizing prefix *iz-* is added to the imperfective verb *pija* yielding the imperfective verb *izpija*. The Grammar of Bulgarian literary language (Andrejchin, 1983: 262) cites 18 perfectivizing prefixes which are used to derive perfective verbs from imperfective ones modifying the root meaning with respect to the mode of action. Some of the prefixes are still semi-lexical, their meaning corresponding to that of prepositions, others are almost desemantized, functioning as perfectivity markers like *iz-*, *za-*, *po-*. Here we do not pursue a discussion of aspect versus Aktionsart or whether the prefixed perfective verbs are forms of the same lexeme as their imperfective stem or represent independent lexemes. For our purpose it is important not to overlook the aspectual nature of such prefixes. As J. Lindstedt (1985:44) points out a primary imperfective verb and its prefixed perfective counterpart can be considered an aspectual pair:

“It must be further stressed that nothing prevents us from speaking of pairs that consist of two different lexemes each. This in fact would be the most natural meaning of the expression ‘aspectual pair’, for we do not call the singular and the plural of a noun a ‘number pair’. Thus Forsyth’s (1970:38 ff.) ‘defense of prefixal pairs, showing that *pisat’ i* and *napisat’ p* function [original emphasis] as syntactic partners, can be accepted without necessarily committing oneself to the single-lexeme solution.”

2. Imperfectivizing suffixation is judged to be the only way of deriving “true” aspectual pairs. This process is also called secondary imperfectivization because it delivers imperfective partners of already prefixed perfective verbs like *izpija* PF - *izpivam* IMPF. In Bulgarian, the secondary imperfectivization by means of the imperfectivizing suffixes *-a*, *-va* is a productive and highly regular aspectual mechanism, producing an imperfective partner from virtually any simple or prefixed perfective verb. The imperfectivizing suffixes do not change the lexical meaning of the perfective verb, yielding an aspectual minimal pair.

While the verbal aspectual properties are traditionally discussed on the basis of minimal pairs, it should be noted that there is a way of linking the pairs which result from perfectivization *pija* IMPF - *izpija* PF (drink-drink up) and secondary imperfectivization *izpija* PF – *izpivam* IMPF. In most cases the root meaning (drink) is preserved in the course of derivation and is only modified by the aspectual affixes. It is important to note that the imperfectivizing suffix does not simply cancel the perfectivity of the prefixed verb. It rather builds up on the perfective verb producing a more complex meaning of iteration.

- (25) Az šte pija_{IMPF} kafe.
'I am going to drink coffee.'
- (26) Az šte izpija_{PF} kafeto/*kafe.
'I am going to drink up the coffee.'
- (27) a. Az šte izpivam_{IMPF} dve čaši kafe /*kafe.
'I will (always) drink two cups of coffee.'
b. Az šte izpivam_{IMPF} kafeto.
'I will drink up the coffee. (I promise.)'

The comparison between sentences (1)-(27) gives an example of the correlation between verbal aspect and the type of direct object. A perfective verb typically requires a definite object marking the limit of the action. An imperfective verb, commonly viewed to put the emphasis on the process of the action without reference to its possible limits, prefers indefinite objects. However, sentence (3a) which contains a secondarily imperfectivized verb is ill-formed with the indefinite (unspecific) object 'coffee' due to the presence of the perfectivizing prefix *-iz* in the verbal stem. The well-formedness of (3b) containing a definite object also suggests, that the sense of completion of the action conveyed by the prefix is not wiped out by the imperfectivizing suffix. The imperfectivizing suffix indicates rather repetition of the action and urges a habitual interpretation of the utterance. In this way, the triplet *pija*_{IMPF} - *izpija*_{PF} - *izpivam*_{IMPF} obtained through subsequent aspectual affixation reflects the compositional nature of verbal aspect in Bulgarian.

Considering such aspectual cycles and a number of syntactic phenomena depending on the aspect of the verb like the overt realization of arguments, Dimitrova-Valchanova (1999:32) argues that imperfectivizing suffixes correspond to a functional category Asp[Imperfective]P operating on a phrase structure level higher than the VP associated with the Perfective feature marked by perfectivizing affixes.

One goal of the present study is to investigate the impact of aspectual morphology on the aspect recognition in normal and impaired language comprehension. Bulgarian verbs without aspectual morphology are normally characterized as perfective or imperfective on semantic grounds, but derived verbs are explicitly marked for Aspect by perfectivizing affixes and imperfectivizing suffixes. The above description of aspectual morphology in Bulgarian motivates two questions. The first question concerns possible differences in processing verbs explicitly marked for aspect and verbs which are morphologically 'uncommitted' to aspect. The second question is whether language processing data could provide support for the linguistically motivated split of what is traditionally called aspectual morphology, as at the

present state perfectivizing prefixation is thought to be more of lexical nature, while the highly regular imperfectivizing suffixation is considered similar to an inflectional process.

Syntactic considerations place Bulgarian perfective prefixes low in the syntactic tree. The imperfective suffixes head a functional category just below the Tense node and “... the verb moves to Asp [Imperfective]’ to incorporate with the imperfective head” (Dimitrova-Valchanova, 1999:36). From this perspective a clause containing an imperfectivized verb has a more complex structure than a clause with a morphologically uncommitted verb. Experimental findings pointing at an increased processing load for imperfectivized verbs could provide psycholinguistic support to such syntactically motivated split representation of Aspect in the structure of Bulgarian clauses.

2. Negative Imperatives

In order to obtain data about Aspect which should be possibly free from the impact other grammatical categories or other factors could have on processing aspectual information, one needs to set up a very controlled experiment. As a category which contributes to the temporal characteristics of the event, defining its internal temporal structure, the Aspect of the verb interacts intricately with Tense, the grammatical category expressing the temporal location of the event.

As Bulgarian lacks infinitives the imperative remains the only tenseless verbal form. The imperative form is built from the verbal stem, preserving all aspectual features, and the imperative inflexion: *-i, -j*. Agreement features play a minor role because they are restricted to the 2nd person singular/plural.

(28) Pij_{IMPF} sok!

'Drink juice!'

(29) Izpij_{PF} soka!

Drink up the juice!

(30) Vednaga/Vinagi izpivaj_{IMPF} soka!

'Immediately/Always drink up the juice!'

The choice of the imperative construction as testing ground for aspect comprehension was determined by the loss of the negative imperative with perfective verbs in Bulgarian. Positive imperative sentences are grammatical with both aspects of the verb. Imperative clauses with perfective verbs express more neutral requests, in the sense that there are no additional connotations, as the situation is projected as completed. The use of a secondary imperfectivized verbs puts stronger emphasis on the request or implies a sense of a general

rule. Negative imperative sentences are well-formed with imperfective verbs but ill-formed with perfective verbs. This fact has led J. Maslov (1948:307) to suggest the negative imperative test as a way to determine true aspectual partners.

- (31) Molja te, kupi_{IM} xljab!
 'Please, buy some bread!'
- (32) * Molja te, ne kupi_{PF} xljab!
 'Please, not buy bread!'
- (33) Molja te, ne kupuvaj_{IMPF} xljab!
 Please, do not buy bread!

The investigation of processing aspectual information in negative imperatives becomes fruitful also with respect to the interaction of aspect with other functional categories such as negation and mood. The presence of sentential negation in imperative clauses (expressed e.g. by the negative particle *ne* (not) in front of the verb) restricts the aspectual choice to the imperfective form.

The negative imperative construction in Bulgarian presents a context of aspectual coercion. In the linguistic and computational literature (e.g. Moens & Steedman, 1988) aspectual coercion is described as an operation that resolves a mismatch between the aspectual properties of the predicate and the specification of a sentential operator. In contrast to English where the aspectual coercion often does not have a morphological reflex and a structural counterpart in syntax, imperfective suffixes in Bulgarian are an overt way to modify the aspect of the verb in direction required by the sentential operator. In the course of structure building, the negative operator *ne* imposes a syntactic restriction on the aspect of the verb, which in the case of a perfective stem can be obeyed only through secondary imperfectivization. In this way sensitivity to the prohibition of perfective verbs in a negative imperative environment is indicative for the ability to use the syntactic information contained in the negative functional element.

Positive and negative imperative sentences have also the advantage of high frequency in every-day communication. This is an important condition for gathering of psycholinguistic data from persons with agrammatism – a neurological impairment due to brain damage characterized by fragmentation and agrammaticality of spontaneous speech.

3. Function words in agrammatic aphasia

“Telegraphic speech” is one of the main characteristics of spontaneous language of Broca’s aphasics and manifests itself in effortful production of even very simplified utterances which is accompanied by omission/substitution of function words. Language comprehension is relatively spared, but sentence constructions like passives and object relative clauses whose interpretation depends on a structural analysis are quite problematic for Broca’s aphasics. (for an overview see Grodzinsky, 2000).

The observable linguistic symptoms of agrammatism are sometimes defined as impairment of the access to closed class morphemes (Linebarger, 1995). The closed class vocabulary is opposed to the open class of words referring to the entities of the world. The closed class is generally taken to include case endings, prepositions, determiners, pronouns, auxiliaries, inflectional affixes and a variety of other bound and free functional items (cf. Friederici & Saddy, 1993). In on-line speech comprehension the closed class morphemes are the elements guiding the structural analysis. They signal phrasal or clausal boundaries and mark relations between sentence constituents, imposing in this way structure on strings of words.

According to A. Friederici’s (1999) neurolinguistically based model of language comprehension, the hearer/reader builds initial syntactic structure utilizing structural information. This process called ‘first-pass parsing’ (Frazier, 1987) is taken to be fast, automatic and impenetrable by other factors such as contextual influences. It reflects the modularity of syntactic processes. The integration of structural and lexical information is achieved in a subsequent step.

As members of the computational vocabulary the functional items can influence the access to the open class words. Formal information of grammatical morphemes can reduce searching times for content words by limiting the number of possible candidates with respect to required grammatical category or other structural properties. In the case of Bulgarian negative imperative constructions the structural information of negation rules out perfective verbs and with them approximately half of the possible candidates (Bulgarian verbs build aspectual pairs). In other words, access to an imperfective verb will be achieved considerably faster.

There are a number of competing theories about the source of language impairment in Broca’s aphasia, which cluster around two fundamental hypotheses. One assumption is that some specific rules of grammar are not longer available for non-fluent patients. The other theoretical position can be characterized as the capacity limitation approach. It claims that the observable agrammatic production/comprehension is due to performance deficiencies (e.g.

impaired access routes, limitations of processing speed or space) while the abstract knowledge of grammar is preserved.

The investigation of normal and impaired processing of the correlation between negation and verbal aspect in Bulgarian imperative sentences can provide additional support for one of the competing theories about the nature of language impairment in Broca' aphasia. Furthermore it presents psycholinguistic evidence for formal syntactic and semantic theories on the properties of Slavic aspect.

4. The experiments

A self-paced reading task was designed to approach the real-time comprehension of negative imperatives in Bulgarian, which are well-formed with imperfective verb but ill-formed with their perfective counterparts. Emphasis was put on processing the interaction between negation and the verbal aspect, and also on the morphological encoding of the aspectual properties of the verb through affixation. Under conditions of ill-/well-formedness the obtained reading times reflect sensitivity to aspectual information encoded in perfectivizing prefixes and imperfectivizing suffixes in the course of structure building. Sensitivity to aspectual properties of the verb indicates ability to use the syntactic information contained in the negative particle and to obey the structural requirements it imposes on the verb.

Based on the structural properties of imperative sentences and the compositional character of verbal aspect in Bulgarian, certain predictions about normal processing of the examined functional items can be made:

1. Neurologically unimpaired native speakers of Bulgarian will detect the prohibited use of perfective verbs in negative imperative clauses. The result should be inhibition of the reaction times on the verb. Furthermore, we expect facilitation of reaction times on the imperfective verbs as the only grammatical and therefore predictable aspect choice. The combined results will be indicative of sensitivity to the syntactic requirements of negation.
2. The effect of prefixes on the processing load is expected to show up as reading delay in contexts where explicit perfectivity markers are in conflict with structural expectations as in negative imperative clauses.
3. In negative imperative context we predict faster reaction times on the imperfectivized verbs due to the 'perfectivity neutralization' achieved by the imperfectivizing suffixes. In the context of positive imperative clauses, where imperfectivizing suffixes do not take the function of syntactic 'repair', we expect longer reaction times on the secondarily imperfectivized verbs indicating increase of processing load due to the more complex

aspectual meaning of the verb and the more elaborate sentence structure (containing the Asp Imperfective node).

For the aphasic subjects we do not make different predictions, pursuing the conservative strategy that “[...] there is no impairment [...]” (Grodzinsky, 1990:54) as long as the experimental data do not provide evidence for deviations from the normal representation/processing of language. Deviations can be of quantitative and qualitative nature, but only a combination of the two types can be suggestive of a representational deficit. If the aphasic data exhibit comprehension patterns similar to those of the neurologically unimpaired test persons no disruption of the investigated elements of grammatical knowledge can be assumed.

An on-line sentence comprehension task in form of Yes/No questions was integrated into the self-paced reading task. Answer scores demonstrate the ability for semantic interpretation of the obtained syntactic representation and the possible impact of (un)grammaticality on it.

4.1. Materials and design

The basic stimuli were 20 lexically perfective verbs chosen to assure that the variation of their aspect by means of imperfectivizing suffixes will produce aspectual minimal pairs. Experimental data from such pairs will reflect the comprehension of functional items associated with the highly regular, inflexion-like process of secondary imperfectivization. From the simple perfective verbs 20 additional verbs were derived by means of prefixes normally used to obtain perfective partners of lexically imperfective verbs like in the examples 4-6. In the present case the perfectivizing prefixes do not change the aspect of the already perfective roots, but can be viewed as overt perfectivity markers in syntactically relevant contexts.

One positive and one negative imperative sentence were constructed with each perfective verb and its imperfectivized counterpart yielding a sentence quadruple. The sentence quadruple represents the 4 test conditions. It consists of one target imperative sentence (ungrammatical), containing negation and a perfective verb, and of three control sentences, one containing negation and an imperfectivized verb (grammatical) and two grammatical positive imperative sentences with a perfective and an imperfectivized verb, respectively. In this way the sentence material preserved the minimal pair design according to the factors grammaticality, verbal aspect and negation. The imperative sentences contained 3 to 5 words, always starting with *molja te* (please) as a clue that the rest of the sentence expresses a request. Table 1 gives an example of a sentence quadruple.

Table 1. Design of the self-paced reading task.

| Condition | Grammaticality | Negation | Perfective Verb | Example |
|--------------|----------------|----------|-----------------|---|
| A Control | ✓ | * | ✓ | Molja te, kupi xljab! Please, buy _{PERF} bread! |
| B Target | * | ✓ | ✓ | Molja te, ne kupi bira! Please don't buy _{PERF} beer! |
| C Control | ✓ | ✓ | * | Molja te, ne kupuvaj meso! Please, don't buy _{IMPF} meat! |
| D Control | ✓ | * | * | Molja te, kupuvaj mljako! Please, buy _{IMPF} milk! |

The stimuli were divided in two groups of 20 quadruples. The first group aimed at testing morphologically underived perfective verbs. In the second group, the remaining 20 quadruples preserved the pattern of the first group but contained sentences with the prefixed perfective verbs and their imperfectivized counterparts. The stimulus set in this study consisted of 160 sentences.

The comprehension test consisted of 100 Yes/No questions. 40 questions matched the ungrammatical target sentences (Condition B: negative imperatives with simple and prefixed perfective verbs). Half of the questions were positive and half of them negative. 20 of the grammatical negative imperative sentences containing imperfectivized verbs (Condition C) were matched with 10 positive and 10 negative questions. The positive imperative sentences (Conditions A and D) received 10 positive and 10 negative questions. Examples of the questions are presented in Table 2.

Table 2. Examples of Yes/No questions

| Condition | Imperative sentence | Answer: Yes! | Answer: No! |
|---------------------------|--|---|---|
| A control (-NEG; + PF) | <i>Molja te, kupi xljab!</i> Please, buy bread! | <i>Da kupja li xljab?</i> Should I buy bread? | <i>Da ne kupuvam li xljab?</i> Should I not buy bread? |
| B target (+NEG; + PF) | <i>Molja te, ne kupi bira!</i> Please don't buy beer! | <i>Da ne kupuvam li bira?</i> Should I not buy beer? | <i>Da kupja li bira?</i> Should I buy beer? |
| C control (+NEG; - PF) | <i>Molja te, ne kupuvaj meso!</i> Please, don't buy meat! | <i>Da ne kupuvam li meso?</i> Should I not buy meat? | <i>Da kupja li meso?</i> Should I buy meat? |
| D control (-NEG; - PF) | <i>Molja te, kupuvaj sok!</i> Please, buy juice! | <i>Da kupuvam li sok?</i> Should I buy juice? | <i>Da ne kupuvam li sok?</i> Should I not buy juice? |

In addition to the stimuli, 80 ungrammatical and 120 grammatical filler sentence were constructed which included different types of syntactic violation. The comprehension task also included 20 additional questions. The fillers were utilized to reduce predictability for the experimental stimuli. The stimuli were pseudo-randomized and a Yes/No question followed each third sentence.

4.2. Subjects

The subjects included 9 non-fluent agrammatic aphasic subjects. Their average age was 48,7 years, ranging from 26 to 59 years. The control group consisted of 35 subjects with no history of neurological or sensory impairment; they were roughly matched for age and education to the aphasic patients. All test participants were native speakers of Bulgarian and belonged to the same North-West dialectal area.

Patients suffered a single lesion in the anterior part of the left hemisphere due to a cerebrovascular infarction (8 patients) or to a traumatic injury (1 patient) at least 4 months prior to testing. All were right-handed. The six male and three female patients were diagnosed according their test scores on the standardized Boston Diagnostic Aphasia Examination (BDAE) adapted for Bulgarian (Alexandrova, 1996)¹, spontaneous speech and clinical records. Slow effortful speech, with short, elliptical utterances and word finding difficulties combined with omission/substitution of function words defined productive agrammatism. Patients were paid for their participation, the normal subjects volunteered.

4.3. Method and Procedure

A self-paced reading task was used. In this task the subjects read sentences word by word in their own reading pace by pressing a button as soon as they have read the word. Reaction times to each word were recorded. The reaction times were measured in milliseconds from the onset of the word to button press. The self-paced reading task was combined with a comprehension task. Every third sentence, read word by word, was followed by an Yes/No question presented as a whole sentence. The subjects were instructed to answer the questions pressing a Yes/No button. Reaction times and answer rate were recorded.

Subjects were tested separately. They were seated in front of a Notebook in a quiet room and were asked to read the sentences on the computer screen. The subjects were instructed to read silently the sentences which can be well-formed or ill-formed and to concentrate on the meaning of the sentences in order to answer a possible Yes/No question. The subjects were told to read the imperative sentences as if they were expressing the requests themselves and to understand the questions as questions of clarification.

The beginning of imperative sentences was signaled by a fixation cross, while a question mark signaled a subsequent question. Both fixation markers were presented in the middle of the screen for 1000 ms. Words appeared in black letters in the middle of a white screen. The reading time for a single word was constrained to 6000 ms. The end of the sentence was

¹ The adaptation of the BDAE for Bulgarian was sponsored by project grant NIH/NIDCD R01 DC 00216, McDonnell Foundation, USA.

indicated by an exclamation mark presented together with the last word. The inter-trial interval was 2000 ms. The subjects conducted the self-paced reading by pressing a response key. Content questions were answered by pressing the Yes/No keys which had different color (green/red) and were labelled Yes/No in Bulgarian capital letters. Answer times were constrained to 30 seconds. Subjects used their (currently) preferred hand for response.

Reaction times and answer scores were automatically recorded using the psycholinguistic program ERST. The stimuli were presented in 6 sessions. Each experimental session lasted about 15 minutes for normal readers. Each session was preceded by 5 initial trials to accustom subjects to the task. For the agrammatic subjects an additional training session was provided.

5. Experimental results

Mean reaction times (RTs) to the verb in the target and the three control conditions were computed for each subject. Reaction times greater or smaller than two standard deviations from the mean in each condition were eliminated and a new mean calculated. The remainder of this section will present subsequently the experimental results of the normal and agrammatic subjects followed by a comparison between them.

5.1. Sentence processing data of the neurologically unimpaired test persons

Figure 1. shows the mean data of the normal test participants, displaying the reaction times (RTs) to both stimuli groups (simple and prefixed verbs) together.

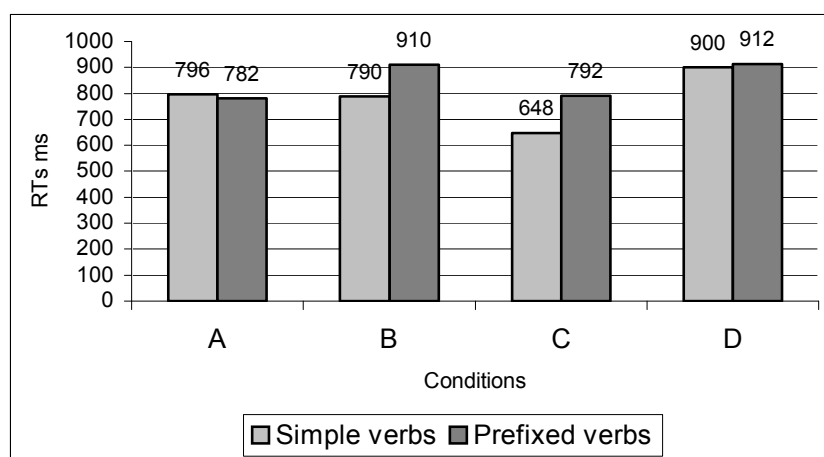


Figure 1: Normal readers' on-line reaction times to the verb

For simple and prefixed verbs the graphs reveal similar patterns of slower RTs to verbs in the target condition B (ungrammatical negative imperatives with perfective verbs) and faster RTs to verbs in the control condition C: grammatical negative imperative sentences containing imperfectivized verbs. While prefixes do not seem to affect the reading times of the verbs in

the positive imperative sentences (conditions A and D), imperfectivizing suffixes cause a substantial increase in reaction times to the grammatical imperfective verb forms (condition D). In the negative imperative sentences the presence of a prefix is reflected in prolonged reading times.

We conducted an analysis of variance (ANOVA) for the factors perfective aspect, prefix and negation in order to present statistical evidence for the initial hypothesis of how normal processing of aspect and negation in imperative sentences looks like. Significant main effects were found for negation ($F(2,34) = 12.4, p < .001$) and prefix ($F(34,2) = 17.3, p < .001$) but not for perfective aspect ($F(2,34) = 0.6, p = .48$). The significant interaction between the factors perfective aspect and negation ($F(1,34) = 44.7, p < .001$) reflects sensitivity to the ill-formedness of negative imperatives with perfective verbs. There was also a significant interaction between prefix and negation ($F(1,34) = 24.8, p < .001$). This finding suggests that in the context of aspectual coercion the prefix is evaluated as morphological marker of the perfective aspectual feature contradicting the requirements of the negative operator. As expected, no significant interaction was found for prefix and perfective aspect – the presence of an overt perfectivity marker does not change the aspect of a lexically perfective root.

Table 3. gives an overview of the correct answer scores achieved by of the normal subjects in the on-line comprehension test. The mean correctness value is 93.2 %.

Table 3. Answer scores of the on-line comprehension test with normal subjects

| Answer Scores | Positive Imperatives | | Negative Imperatives | |
|---------------|----------------------|--------|----------------------|--------|
| Questions | A | D | * B | C |
| Positive | 94.3 % | 90.0 % | 94.9 % | 98.0 % |
| Negative | 92.0 % | 96.8 % | 88.6 % | 90.6 % |

A closer examination (ANOVA with factors ungrammaticality and negation) of the correct answer rates obtained for questions clarifying negative requests reveals a significant effect of ungrammaticality of the negative requests ($F(34,2) = 4.97; p = .03$). The effect of asking a negative question to a negative imperative clause is clearly stronger ($F(1,34) = 45.06; p < .001$).

5.2. Sentence processing data of the agrammatic test persons

Figure 2 presents the mean reaction times of the aphasic group in the four conditions for both, simple and prefixed verbs. The graphs B and C, which represent the reading times for the verb in the ill- and well-formed negative imperative sentences, show a clear contrast between the fastest reading times (for the grammatical imperfectivized verb forms) and the slowest reading times for the prohibited perfective verbs.

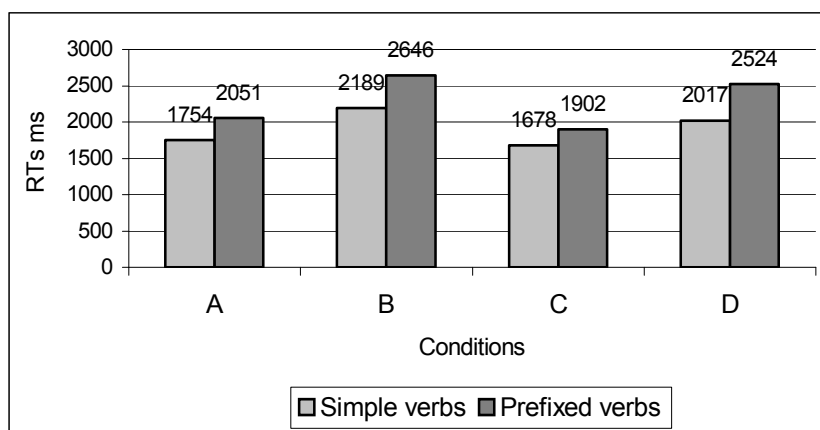


Figure 2: Aphasic readers' on-line reaction times to the verb

The same ANOVA analysis as for the reaction times of the unimpaired subjects was computed with the on-line data of the agrammatic aphasics. A significant main effect was found for prefix ($F(2,8) = 12.9$; $p = .007$) but not for perfective aspect and negation. There was a significant interaction between perfective aspect and negation ($F(1,8) = 33.8$; $p < .001$), which indicates retained sensitivity to aspect requirements of negation in imperative clauses. The interactions between prefix and negation and between perfective aspect and prefix did not reach significance.

Table 4. Correct answer scores of the comprehension test with agrammatic subjects

| Answer Scores | Positive Imperatives | | Negative Imperatives | |
|---------------|----------------------|---------------|----------------------|---------------|
| | A | D | * B | C |
| Positive | 85,6 % | 83,3 % | 62,2 % chance | 76,7% |
| Negative | 71,1 % | 60,0 % chance | 58,3 % chance | 55,6 % chance |

Table 4. displays the correct answer scores to the Yes/No questions of the agrammatic subjects in the on-line comprehension test. The correct answer scores of questions related to negative requests are at chance level. The analysis of variance exploring the comprehension of negative imperatives reveals no significant effect for the factors ungrammaticality of the negative request and negative question, but a significant interaction between them ($F(1,8) = 10.92$, $p = .01$).

5.3. A between-group comparison

The between-group analysis of the on-line reading times of normal and agrammatic subjects reveals a significant effect of group ($p < .001$). We found significant effects for all three factors of the stimulus design: prefix ($F(2, 42) = 48.1$; $p < .001$), perfective aspect ($F(42,2) = 4.5$, $p = .04$) and negation ($F(42,2) = 4.3$, $p = .045$). The differences in normal and impaired

processing of perfective verbs and prefixed verbs observable in the charts (Fig. 1 & 2) are reflected in the interaction between group and perfective aspect ($F(1,42) = 5.7$; $p = .02$) and between group and prefix ($F(1,42) = 17.6$; $p < .001$). For the agrammatic test persons the presence of a prefix always induced longer reading times as compared to the unprefixed verbs in all four conditions. For the normal test persons a similar reading delay was found only in the context of negative imperative sentences. In the context of positive imperative clauses, the prefix did not prolong the reading times of the verbs. There was no influence of the factor group on negation suggesting that the normal and aphasic subjects processed the verbs in the negative conditions similarly. Such interpretation seemingly contradicts the results of the aphasic data analysis presented in section 5.2, where no effect of negation was found contrary to the significant effect of negation in the data analysis of the control group (section 5.1).

A closer examination of the relation between the reading times for verbs in the positive (A/D) and the negative (B/C) conditions explains the different results. Taken together, verbs after the negative particle are read by the normal subjects faster than the verbs in positive sentences. The longest reaction times were elicited on the positive imperfectivized verbs and not on the perfective verbs prohibited after negation (condition D > condition *B).

For the aphasic subjects, detection of ungrammatical perfective verbs in the context of sentential negation caused a notable increase of processing load, which was higher than the one induced by the morphologically more complex imperfectivized verbs in the well-formed positive imperative clauses. Compared to the control group, the reversed relation between the slowest reading times for the verb in the well-formed and ill-formed requests is true (condition D < condition B).

It is worth noting once again, that in the context of positive requests the reading times for grammatical imperfectivized verbs were considerably longer than those for perfective verbs and that this fact is not due to the length difference of one syllable. In a negative context the same imperfectivized verbs are read considerably faster. Comprehension of secondarily imperfectivized verbs is a more demanding process due the more complex aspectual meaning conveyed by the imperfectivizing suffixes.

The interactions between perfective aspect and negation ($F(2,42) = 112.5$, $p < .001$) and the threefold interaction of perfective aspect, prefix and negation ($F(2,42) = 7.6$, $p = .009$) were highly significant and there was a clear impact of the factor group on them ($p < .001$ in the first case, $p = .006$ in the second). As already mentioned above we interpret this result to be indicative of the interaction between mood, negation, and verbal aspect in the course of structure building.

The between-group analysis of the answer scores achieved by the normal and aphasic subjects in the on-line comprehension test shows that the ungrammaticality of negative request

($F(1,42) = 7.5, p = .009$) influences the subjects' ability to answer content questions. No interaction between this factor and group was found suggesting that both groups behaved similarly, showing weaker performance on questions to ill-formed negative imperatives.

However, it is important to keep in mind that for normal subjects interpretation of the meaning of ill-formed negative requests is not really problematic (95% correctness rate for positive questions). On the contrary, the chance level correctness score (62%) achieved by the aphasic subjects reveals that they were not able to assign a meaning to the negative imperatives containing a morpho-syntactic violation (an aspectually inappropriate verb). For the factor negative question a clear effect ($F(1,42)=25.9, p < .001$) and no interaction with the factor group was found. The presence of negation in both, request and clarifying question, induced interpretive difficulties not only for the aphasic group.

6. Conclusions

The predictions about normal processing of negative imperatives were confirmed by the experimental data. Inhibition of the reaction on the perfective verb and facilitation of the reaction on the imperfective verb in the imperative negative sentences reflect the effect of the negative functional element on the process of structure building.

The agrammatics performed the self-paced reading task with a slower processing speed but their reaction times preserved the pattern of the control group, showing syntactic priming of imperfective verbs by negation and sensitivity to the ill-formedness of perfective verbs. These findings suggest that the Broca's aphasics are able to access and to use the syntactic information of the negative markers and the required aspectual features of the verb.

Predictions about processing of the morphological aspectual markers are borne out by the experimental data. The pattern of reaction times of the control group indicates that prefixes function as perfectivity markers in syntactically relevant contexts. With respect to the imperfectivizing suffixes, the experimental findings also confirmed the initial predictions. Compared to their perfective counterparts, the secondarily imperfectivized verbs elicited significantly longer reading times in positive imperatives. The increased processing load is considered to reflect the more complex aspectual meaning of verbs bearing imperfective morphology and the more elaborate structure (containing the Asp Imperfective node) of sentences involving imperfectivized verbs.

Prefixation seems to have the same effect on the aphasic comprehension of perfective verbs in negative imperatives, but it also causes a significant reading delay for verbs in positive imperative sentences. The inhibited reaction on the prefixed imperfectivized verbs in well-formed positive requests is particularly interesting because it presents evidence for retained and even 'exaggerated' sensitivity to the compositional nature of aspect in such forms, on the

one hand, and to the higher syntactic complexity of sentences containing imperfectivized verbs, on the other hand.

A clear difference between normal and impaired processing manifested itself in the ability to interpret the meaning of the negative imperatives regardless of the aspectual appropriateness of the verb. Normal subjects assign a meaning to both well-formed and ill-formed sentences and answer content questions properly. Agrammatics gave chance answers to content questions, which reflects their poor comprehension of negative imperatives involving an aspectually inappropriate verb. While Negation and Aspect as functional categories marking semantic properties, seem not to affect the agrammatics' abilities to derive the syntactic representation of negative imperatives, for interpretation they show an additive effect to the extent that an interpretation of sentence meaning is not available.

The experimental findings suggest that normal and agrammatic sentence comprehension diverge with respect to computational resources available to integrate information into the sentential context in due time. The pattern of results presented here support the view that the source of impairment for agrammatic comprehension is the interface between syntactic representation and semantic interpretation and not in the syntactic representation itself.

The psycholinguistic data of the present study is relevant not only for the comparison between normal and impaired processing of free (negation) and bound (aspectual affixes) closed class items. Experimental design and working hypothesis were motivated by linguistic assumptions about the nature of Bulgarian verbal aspect and its morphological encoding. The pattern of the obtained on-line language processing data provides support for the compositional nature of verbal aspect in Bulgarian and for the formal split between perfective and imperfective morphology argued for in current syntactic and semantic approaches to Slavic aspect.

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Processing clitic pronouns in Bulgarian – Evidence from normal and agrammatic comprehension

Abstract

Clitic clusters display a complicated interaction of prosodic and syntactic properties which determines their word order and stress patterns. In Bulgarian, short pronouns appear as unstressed verbal enclitics in positive utterances. Proclitic negation attracts the pronouns and forms with them a prosodic unit stressed on the second syllable, the pronoun. Theoretical linguistics characterizes the behaviour of object clitics in terms of 'non-trivial chains' (Boškovič 2001) containing copies. The overt realisation of a higher or lower copy depends on phonological constraints like enclitisation requirements. In line with the slow-syntax-hypothesis (Burkhardt et al. 2008) and with the assumption that prosody-related processes may also compete for the same limited processing resources of Broca's aphasics (Avrutin et al. 1999), we test sensitivity to the phono-syntactic constraints negation imposes on the word order of personal and reflexive clitics. Results suggest that the pattern of agrammatic processing of clitic clusters resembles normal comprehension but proceeds in a protracted manner. Employing a self-paced reading task and an experimental design which reduces discourse-related interpretation processes, we also show that the syntactic functions of personal object clitics as syntactic object agreement markers in Bulgarian are relatively preserved in the aphasic group.

Key words: agrammatism, Bulgarian, clitic cluster, self-paced reading

1. Introduction

Bulgarian is a discourse-configurational pro-drop language without nominal case marking (Kiss 1995). Bulgarian features several types of clitic elements such as pronominal and auxiliary clitics, the negative proclitic *ne* "not" and the question particle *li*. These in their nature very different elements form a clitic cluster which cannot be penetrated by other lexical material. Contrary to the free word order of nominal constituents, clitic placement in the cluster follows a rigid order. The clitic cluster represents an independent prosodic unit which must be adjacent to the verb. The word order of the clitics within the cluster and its regular position with respect to the verb as presented in (1) is illustrated in (2).

(1) neg aux dat acc V

(2) Ti_{2SG NOM} ne_{NEG} si_{AUX 2SG PRES} mu_{3SG DAT} go pokazal.

You not are him it shown.

'You have not shown it to him.'

In Bulgarian, personal (in the oblique case) and reflexive pronouns exhibit two forms: full tonic pronouns like *mene* "me", *sebe si* "myself", and their short unstressed counterparts *me* and *se*, respectively. The functional distribution of full and short forms is associated with

topic/focus distinctions and is regulated by prosodic properties. Long forms are used e.g. in constructions with contrastive focus and with prepositions, while short forms are required for the marking of topic referents (Nicolova 1986).

From a syntactic point of view, the short pronouns in Bulgarian are verbal clitics. They form a morpho-syntactic unit with the verb. Phonologically, they are enclitic elements as they cannot appear sentence initially. In such cases they have to be hosted by the verb and appear in a post-verbal position. Consider the position of the clitic cluster in (3) in which the subject pronoun is dropped.

(3) Pokazal si AUX 2SG PRES mu 3SG DAT go 3SG ACC MASC/NEUTR

Shown are him it.

'You have shown it to him.'

Clitic pronouns and clitic clusters exhibit a complicated interaction of prosodic and syntactic properties which determines word order and stress patterns in the phonological output (see Werkmann 2003 for an extended overview and discussion of syntactic approaches to clitic placement in Bulgarian).

In this paper we investigate the processing of direct object pronominal clitics under negation, which regularly build together a clitic cluster (Rå Hauge 1999). Negation is a functional category overtly realised as a verbal proclitic. In case of predicate negation, no adverbs may intervene between the negative marker and the verb. The presence of negation has a significant impact not only on the interpretation of the utterance, but also on the derivation of syntactic structure and its prosodic properties after spell-out. In case of narrow scope constituent negation, the negative marker selects a long pronominal form (4a), while a short pronoun is ruled out (4b).

(4) a. Ne nego LONG 3SG ACC MASC/NEUTR viždam, a neja LONG 3SG ACC FEM

b. Ne *go CL 3SG ACC MASC viždam, a *ja CL 3SG ACC FEM

Not him see but her

'I see her not him.'

In case of wide scope sentential negation, the negative marker combines only with a short pronominal form. The proclitic negation attracts the enclitic short pronoun and they form a prosodic unit by mutually satisfying their prosodic requirements. The resulting clitic cluster is stressed on the second syllable, the pronoun (5). The negative marker and the direct object clitic yield together a prosodic unit with a iambic stress pattern. The stress pattern of the clitic

cluster thus exemplifies the generally iambic rhythm of Bulgarian speech.¹ The cluster attaches itself to the verb, barring other lexical material from intervening between them. In contrast to the direct object clitics, nominal objects do not move in front of the verb in case of sentential negation (6). In positive sentences, pronominal clitics appear after the verb if sentence initially there is no lexical material to support them (7).

(5) Ne gó_{CL 3SG ACC MASC/NEUTR} viždam_{1SG PRES}.

Not him/it see

'I don't see him/it.'

(6) Ne viždam_{1SG PRES} deteto.

Not see the child.

'I don't see the child.'

(7) Viždam_{1SG PRES} go_{CL 3SG ACC MASC/NEUTR}.

See him/it

'I see him/it.'

Given this distribution, we need a more precise idea of the syntactic and prosodic mechanisms which determine it, and which inevitably influence both production and comprehension of negative sentences. In order to better understand how sentence comprehension proceeds, we need to consider not only such factors as frequency, length and phonological salience, but also syntactic and prosodic factors which increase the predictability of structure building and thus support the incremental integration of lexical elements.

Online experimental data on the processing of sentences involving clitic clusters may deepen our understanding on the nature of the phonology-syntax interface. The comparison of normal processing data with language breakdown data from agrammatic aphasics may yield valuable insights in two respects. First, under the assumption that agrammatism is due not to a general syntactic deficit, but to a slowed-down implementation of syntactic operations (Burkhardt et al. 2008, Burkhardt 2005, Haarman & Kolk 1994, and Pinãngo 2002 *inter alia*), we expect the agrammatic data to work as a magnifying lens to the healthy system. Through such a comparison we can learn more about the relative influence of syntactic and prosodic features on clitic placement.

Second, the study approaches questions concerning the tacit knowledge of clitic properties aphasic individuals may have preserved. Due to their status as unaccented functional elements, pronominal clitics often lack in agrammatic speech (for cross-linguistic evidence see Rossi

¹ Consider a comparison between Bulgarian and German, both of which are not fixed-stress languages. However, their general speech rhythms exhibit opposite patterns: iambic in Bulgarian and trochaic in German.

2007, Stavrakaki and Kouvava 2003 and Menn & Obler 1990 inter alia). With respect to the sensitivity to stress and prosodic information, some studies have presented evidence that a brain damage in the left hemisphere causes a general prosodic deficit which for sentence comprehension is manifested by difficulties to utilise linguistic prosodic cues (Baum et al. 1982, Cappa et al. 1997, Pell & Baum 1997). In a similar vein, Burchert and his colleagues (2005b) argue that agrammatic individuals do not profit from contrastive stress for the discrimination of unambiguously case-marked sentence constituents.

The study of Avrutin et al. (1999) on the impact of contrastive stress on the interpretation of English pronouns shows mixed results. The study uses a picture-selection task with stimuli of the type *First John hit Bill and then Mary hit him/HIM* in which the stressed pronoun refers to the subject *John* while the unstressed pronoun refers to object *Bill* of the first clause. Although the aphasic group performed at chance level in both conditions, the direct comparison of object choices reveals that in the stressed condition the rate of object selection is significantly lower. In other words, the results of the stressed condition hint at some preserved abilities with respect to comprehension of stress as a reference determiner. The authors conclude that Broca's aphasics may not be able to implement this prosodic cue to a full extent during a discourse-based reference establishment. They reason that the complexity of the applied task may attenuate the effect of prosody and advocate tasks which target stress-induced morpho-syntactic operations and thus avoid discourse processing.

The present experiment has been designed to reduce interpretation efforts as far as possible. It examines the impact of the phono-syntactic properties of negation on clitic cluster formation by targeting sensitivity to position violations during reading. The self-paced reading task uses negative imperatives as stimulus sentences. Imperatives have an advantage over finite clauses against the background of converging on- and offline experimental findings which locate the source of agrammatic behaviour at the structural and notional representation of tense (Burchert et al. 2005a, Faroqi-Shah & Dickey 2009, Yarbay Duman & Bastiaanse 2009, Wenzlaff & Clahsen 2004), and strengthen the notion that tense disturbances do not necessarily prune the syntactic structure (Burchert et al. 2008, Dickey et al. 2008, Stavrakaki and Kouvava 2003). Additionally, the experiment seeks to contribute to the discussion revolving around differences in the comprehension of personal and reflexive pronouns. We explore the hypothesis that the processing load of reflexive and personal pronominal clitics may vary with respect to different phono-syntactic environments and with respect to the availability of potential referents.

The paper is organised as follows. Section 2 provides a background on the linguistic assumptions underling the experiment. Section 3 describes the experimental method in terms of participant groups, procedure and materials. Section 4 presents the experimental results and

a comparison between the processing patterns obtained from normal and agrammatic comprehension of pronominal clitics in negative imperatives. A discussion of the experimental findings with respect to the aims of the study and a general conclusion follow at the end.

2. Linguistic background

2.1. What determines the clitic placement in Bulgarian?

In the literature on clitic placement in Bulgarian, the discussion revolves around the mechanisms guiding pre-verbal or post-verbal realisation of clitic elements. Leaving aside conceptual differences about the status of clitics as heads (Rivero 1994, Franks & Rudin 2005, Werkmann 2003) or non-branching maximal projections (Bošković 2001, 2002), the trigger and the landing site of their movement, all syntactic accounts agree that syntactic derivation moves the clitics to the left of the verb. The syntactic approaches diverge with respect to their accounts of the structures in which the pronominal clitics are realised in a post-verbal position. At this point, the prosodic properties of clitics start to play a role for the spell-out of the syntactic structure. The discussion revolves around the availability of movement at the level of PF. Indeed, some of the strongest arguments for the existence of Prosodic inversion (Halpern 1992, 1995) are based on clitisation in South Slavic. Among others, Rudin and her co-authors (1997, 1999) and Caink (1999) argue that clitic placement in Bulgarian appeals to prosodic inversion in some configurations.

Another approach which takes into account the special prosodic status of clitic elements but leaves clitic placement a matter of syntactic derivation is proposed by Bošković (2001). After an extensive survey of clitic position patterns in South Slavic languages he presents an analysis in terms of non-trivial chain formation. Under this approach, syntactic movement of the verb and of the clitic elements creates a chain of copies, not of traces (Chomsky 1993). This is a relevant difference as in a chain of traces, only the head of the chain is supposed to be the location of the phonological form. No such restriction applies to a non-trivial chain of copies (8). The overt realisation of copies is regulated by the same principle unless the pronunciation of the head copy would result in a violation of phonological requirements.

In Bulgarian, copy movement places a pronominal clitic in front of the verb while leaving a lower copy in a post-verbal position (9a). In case no lexical material is located in front of the clitic (9b), the head of the non-trivial chain is left unsupported, which produces an ill-formed construction. Pronunciation of the next lower copy satisfies the enclitisation requirement of pronominal clitics allowing for the enclitic element to be hosted by the verb (9c).

(8) clitic_{head of chain} Verb clitic_{lower copy}

- (9) a. Az go_{head} kupix gø_{lower copy}.
 b. *Go kupix gø.
 c. gø Kupix go.
 'I bought it.'

The prosodic constraints on clitic pronouns determine which copy has to be realised overtly. All other copies are deleted. In the presence of negation, the phono-syntactic properties of the post-stressing negative marker interact with those of the pronominal clitics and induce the pronunciation of the highest element of the pronominal chain. In Bulgarian, the negative marker *ne* heads its own functional projection NegP which is situated higher than TP. In imperative sentences which do not have TP, NegP is above Agr_SP (Tomić 2005). Negation as a verbal proclitic does not influence the stress pattern of the adjacent verb, but it induces stress on the pronominal clitic adjacent to it in the clitic cluster. In the clitic cluster, the negative particle is the first syllable of the phonological word while the direct object clitic is the last one. The verb is immediately adjacent to the cluster and therefore to the direct object clitic. Knowledge about the phono-syntactic properties of the negative marker guides the structural expectation and the integration of subsequent information chunks during the processing of negative sentences containing pronominal clitics.

2.2. Specific properties of personal and reflexive direct object clitics

In a cluster containing negation and a direct object clitic, two different pronominal types may appear: a personal pronoun and a reflexive pronoun. They are subject to the same phono-syntactic restrictions and occupy the same direct object position. Nevertheless they exhibit quite a different referential behaviour. Reflexive pronouns and, more specifically, direct object reflexive clitics establish a co-reference relation to the sentential subject based on syntactic principles. In contrast, pronominal direct object clitics do not refer to the sentential subject apart from some very restricted cases. The definition of the principles guiding the interpretation of reflexives and pronouns has undergone considerable changes during the last decades. Consider for instance the three major approaches: Government and Binding, Reflexivity (Reinhard and Reuland 1993) and Primitives of Binding (Reuland 2001). A discussion of these developments is beyond the scope of the present paper. Notwithstanding their differences, all three approaches provide evidence that the bound interpretation of a reflexive pronoun is structurally based. The last approach, Primitives of Binding, involves economy considerations which makes it more accessible for psycholinguistic research. In sum, the interpretation of a reflexive object clitic results from syntactic operations and is carried out within the sentence boundaries (see an extended discussion in Ruigendijk et al. 2006). The

interpretation of a personal object clitics depends on the contextual availability of referents which may or may not be provided in the same sentence. Thus interpretation of pronouns depends on the establishment of a discourse model and the search of appropriate referents in it (see Avrutin 1999 and Burkhardt 2005 for a discussion of the syntax-discourse interface).

Apart from the mechanisms concerning the interpretation of reflexive and personal pronouns, these two pronominal types have different effects on the predicate they are attached to. If the direct object position of a transitive predicate is occupied by a reflexive pronoun, the arity of the predicate is reduced. Reflexive clitic pronouns in Bulgarian are not specified for person, gender and number. The only distinction they express is that of case: *se* is the direct object form and *si* the indirect object form of the reflexive clitic. The co-reference establishment between the direct object reflexive clitic *se* and the subject yields argument reduction of the otherwise two-place predicate (see Grimshaw 1990 for a discussion of the argument absorption induced by reflexive pronouns).

With respect to the function of personal object clitics in Bulgarian, we find a broad consensus between different theoretical approaches. The close association of the clitics with the verb and the precise analysis of the clitic doubling phenomenon have lead to the conclusion that the clitics are best understood as syntactic object agreement markers. Although they do not have reached the status of the bound verbal inflection affixes which license the subject drop in Bulgarian, they have acquired similar functions for licensing object drop (Stanchev 2007). Within the generative framework, pronominal clitics have been defined as functional heads (Rudin et al. 1999, Franks & Rudin 2005) or non-branching XPs (Bošković 2002) which check their features at the respective AgrP. According to the split-IP hypothesis (Pollock 1989) scrutinised for Bulgarian by most of the authors², the functional projections Agr_{IO}P and Agr_{DO}P are situated below TP in the syntactic structure. These syntactic characteristics of the direct object clitics have interesting processing implications, especially in the cases where co-reference establishment has to be postponed due to unavailability of discourse referents.

3. Method

To evaluate the processing of pronominal clitics in clitic clusters and to assess participants' knowledge of phono-syntactic constraints on clitic placement under negation, a self-paced reading task was employed. We used a stationary window method for a word-by-word presentation of positive and negative imperative sentences with reflexive and personal direct object clitics. The contrast between these pronoun types provides for a better distinction

² See i.e. Rudin (1997) who suggests for Bulgarian the following structure [CP[MP[NegP[MP2[T/Agr_sP[Agr_{IO}P[Agr_{DO}P[AuxP[VP...]]]]]]]]].

between the relative weight of processes induced by the syntactic and by the referential properties of clitic pronouns in the course of sentence comprehension.

3.1. Participants

Nine individuals (6 male and 3 female) diagnosed with Broca's aphasia after a CVA in the left hemisphere and 31 unimpaired controls (17 male) participated in this experiment. All participants are native monolingual speakers of Bulgarian.

Table 1. Demographic data on the aphasic group

| Subject | Sex | Age | Years of education | Months post-onset | Etiology | Severity rating | Fluency rating | Comprehension of commands-15 |
|---------|-----|-----|--------------------|-------------------|----------|-----------------|----------------|------------------------------|
| KM | f | 45 | 11 | 3 | LCVA | 4 | 4 | 15 |
| DY | m | 32 | 11 | 12 | LCVA | 1 | 2 | 13 |
| MP | m | 46 | 16 | 46 | LCVA | 4 | 3 | 15 |
| AR | f | 55 | 16 | 64 | LCVA | 4 | 4 | 14 |
| MB | f | 46 | 16 | 5 | LCVA | 3 | 3 | 15 |
| DD | m | 59 | 12 | 35 | LCVA | 3 | 3 | 15 |
| IH | m | 51 | 11 | 29 | LCVA | 3 | 2 | 15 |
| TM | m | 54 | 16 | 17 | LCVA | 4 | 4 | 15 |
| MM | m | 59 | 16 | 29 | LCVA | 1 | 1 | 11 |

The aphasic participants were moderately to severely impaired according to their scores in the Bulgarian version of the Boston Diagnostic Aphasia Examination (Alexandrova et al. 1996) and clinical consensus. They ranged in age from 32 to 59 (mean age 49,7) and were at least 4 months post-onset at the time of testing.

The speech production of all patients was non-fluent with short utterances, breaks and automatisms. Transcriptions of free conversation samples and retelling of the Little Red Riding Hood story reveal that they rarely produce pronominal clitics and even fewer clitic clusters. All aphasic participants showed a preserved comprehension of commands. Demographic and general language testing data for the aphasic participants are provided in Table 1. The performance of the non-fluent speakers was compared to the performance of a group of 31 Bulgarian non-brain damaged speakers matched in age and education. The control participants ranged in age from 31 to 60 years (mean age 48,7) and reported no prior history of language-, learning- or neurological impairments.

3.2. Materials and procedure

We used 3 types of short imperative sentences to test sensitivity to violations of the well-formedness restrictions on clitic placement under negation. Each sentence type comprised 40 sentences. The first type included well-formed sentences in which the proclitic negative particle *ne* and the pronominal enclitic form a clitic cluster. This clitic cluster procliticises to the verb, and no other elements may intervene between the clitic cluster and the verb. In the clitic cluster, the direct object clitics appear pre-verbally and receive stress (10). The second sentence type features ungrammatical negative imperatives. The ill-formedness results from the post-verbal realisation of the pronoun, as an enclitic (11). The enclitic position violates the phono-syntactic well-formedness requirement of clitic cluster formation under negation. The third sentence type presents well-formed positive imperative sentences in which the pronoun is realised in a post-verbal position, as there is no other clause-initial material to host the phonologically enclitic pronoun (12). This sentence type serves as a base line instantiating the processing of enclitic pronouns.

(10) Well-formed negative imperatives with pronouns in a pre-verbal position (cluster)

a. Molja te, ne go PERS 3SG MASC/NEUTR ACC krij otzad!

Please, not it/him hide behind

'Please, don't hide it behind!'

b. Molja te, ne se REFL ACC krij poveche!

Please, not yourself hide more!

'Please, don't hide any longer!'³

(11) Ill-formed negative imperatives with pronouns in a post-verbal position

a. Molja te, ne krij *gi PERS 3PL ACC sega

Please, not hide them now

'Please, don't hide them now.'

b. Molja te, ne krij *se REFL ACC tuka!

Please, no hide yourself here

'Please, don't hide here.'

³ The English translation may be misleading, as the verb *hide* freely appears as a one-place predicate. In Bulgarian, the transitive verb *krija* "hide" is a regular two-place predicate, and it becomes subject to arity reduction only if used reflexively.

(12) Well-formed positive imperatives with pronouns in a post-verbal position

- a. Molja te, krij *go* PERS 3SG MASC/NEUTR ACC b̃arzo!
Please, hide it/him fast
'Please, hide it/him fast!'
- b. Molja te, krij *se* REFL ACC dobre!
Please, hide yourself well
'Please, hide well!'

In order to check the impact of syntactic binding on the processing of clitic pronouns, we contrasted personal direct object clitics with reflexive clitics. We selected 20 transitive verbs and used them iteratively with personal pronouns (10a-12a) and with the reflexive pronoun *se* (10b-12b). We used direct object pronouns in the 3rd person plural *gi* “them” and in the 3rd person singular *go* “it/him”. The latter is underspecified for masculine and neuter gender, as well as for the animacy of potential referents. The selected personal direct object clitics are of the same length as the reflexive pronoun *se* which is underspecified for number, person and gender and only marks accusative case.

In the present test, the participants can determine the referent of the pronominal clitics only when reflexive pronouns are used. The establishment of a co-reference relation between the reflexive pronoun and the second person subject of the imperative sentence is guided by syntactic computation. In contrast, the sentences containing personal pronouns do not provide any information about possible referents. Co-reference establishment between the 3rd person clitics and the 2nd person singular non-overt subject is blocked by the mismatch of agreement features. Without contextually available referents, the direct object clitics only function as object agreement markers in the present stimuli.

In addition to the 120 stimuli of the present experiment, there were 240 other sentences from 2 other experiments, one third of which contained different types of ungrammatical sentences. The other two experiments investigated comprehension of aspectual restrictions under negation in analytic and synthetic imperative constructions (Kuehnast 2003). Their stimuli involved only nominal objects. All sentences together yielded a 2:1 ratio of well-formed and ill-formed stimuli. The stimuli of the three experiments were randomised and complemented with comprehension questions after every third sentence. The stimulus set was divided into 6 parts, each lasting 10 to 15 minutes. Each part started with 5 training sentences. The aphasic individuals performed 1 or 2 parts per session followed by a break of 3 to 5 days. The control group performed the whole experiment in one session with short breaks between the parts, and one major break after the 3rd part in which they were given an off-line task.

The experiment uses a self-paced reading task with a stationary window. The participants were instructed to read silently the sentences which could be well-formed or ill-formed, and to concentrate on the meaning of the sentences in order to answer comprehension questions. They were told to read the imperative sentences as if they were expressing the requests themselves and to understand the questions as clarification questions posed by the addressee of the requests. After a fixation cross, each sentence appeared word by word in the middle of a laptop screen. The end of the sentence was signalled by an exclamation mark presented together with the last word. The participants read the sentences at their own pace by pushing a response button. Yes/No answers to the comprehension questions and response latencies were obtained by pressing either a green or a red response key labelled Yes and No in Bulgarian capital letters. An example of a request and an a clarification question is presented in (13-14)

(13) Imperative sentence

Molja te, drāzh 2SG IMP IMPF go PERS 3SG ACC otdolu!

Please, hold it beneath

'Please, hold it at the bottom!'

(14) Clarification question

Otdolu li da go PERS 3SG ACC dārzha 1SG PRES IMPF?

Beneath question particle that it hold

'Should I hold it at the bottom?'

3.3. Relevant data

Reaction times to each word in the imperative sentences, answers and response latencies for the comprehension questions were recorded automatically in milliseconds by means of the psycholinguistic program ERTS⁴. The clitic pronoun and the word following the pronoun are taken to constitute the critical processing region in the experimental stimuli. The response latencies measured at these two points are supposed to reflect processing effects relevant for the present research questions. Therefore the mean RT to the clitic pronoun and the mean RT to the word following the pronoun are the dependent variables in the current experimental design. The obtained RTs were trimmed by excluding values of more than 3000 ms or less than 200 ms, as well as outliers with more than 2,5 standard deviations above or below the mean RT for each participant per condition. This process excluded 5,9 % of the control participants' data and 7,1 % of the data of the aphasic participants.

In the well-formed negative sentences, the verb is adjacent to the clitic cluster and thus immediately follows the pronominal clitic. In the other two sentence types, the verb precedes

⁴ Experimental Run Time System software and gear (ERTS, BeriSoft, Germany).

the clitic pronoun, which is followed by a manner adverb or by a preposition introducing a locative or an instrumental prepositional phrase. While all verbs are two-syllabic and feature 4 to 6 characters, the adverbs and the prepositions differ in length. Therefore, the words following the clitics were assigned to one of three length groups: short length (1-3 characters), middle length (4-6 characters) and long length (7- 9 characters). Subsequently, we calculated the mean RT for each word length group per person and per condition. Here we report analyses which are based on the mean RTs of the words of middle length in order to avoid word length confounding the comparison between the mean response latency for the verb and those for the adverbs.

4. Results

Below we present separate statistical analyses for each participant group. With respect to processing of pronominal clitics, Bulgarian is an under-researched language and we need to establish a pattern of regular processing first. The pattern obtained from the aphasic data will be compared to the established norm. Mean reaction-time data are presented by the condition for the control group in Table 2 and for the aphasic group in Table 3.

4.1. Control group

We conducted a repeated measures analysis of variance (ANOVA) on the RT to the pronouns with pronoun type (personal, reflexive) and sentence type (positive, post-verbal clitic; negative post-verbal clitic & negative, pre-verbal clitic) as within-subject factors. The analysis revealed main effects of sentence type ($F(2,29) = 7.492, p = .002$) and of pronoun type ($F(1,30) = 71.445, p < .001$), and no significant interaction between them ($F(2,29) = 1.507, p = .239$). clitic cluster than when they appear in a post-verbal position.

Table 2. Reaction time data of the control group per condition

| Sentence type | Pronoun type | Clitic | | Next word | |
|--------------------|--------------|------------|----|------------|----|
| | | mean RT ms | SE | mean RT ms | SE |
| Pos + post-verbal | reflexive | 618 | 23 | 838 | 29 |
| | personal | 586 | 22 | 612 | 30 |
| *Neg + post-verbal | reflexive | 612 | 23 | 857 | 45 |
| | personal | 579 | 22 | 864 | 42 |
| Neg + pre-verbal | reflexive | 603 | 23 | 691 | 27 |
| | personal | 552 | 21 | 626 | 28 |

SE – standard mean error

The main effect of sentence type shows that pronominal RTs differ mainly as a result of their position. Pronouns are read significantly faster when they appear pre-verbally as a part of a The well-formedness of the sentence is less decisive for the RT elicited by pronouns. The pair-wise comparison shows that post-verbal pronouns in the well-formed positive sentences are not read faster than those in the ill-formed negative sentences (596 ms). Within the negative conditions, the erroneous post-verbal clitics tend to be read more slowly than the pre-verbal ones ($p = .064$). The main effect of pronoun type and the lack of an interaction with sentence type show that reflexive clitics are always read more slowly than the personal clitics (see Fig 1).

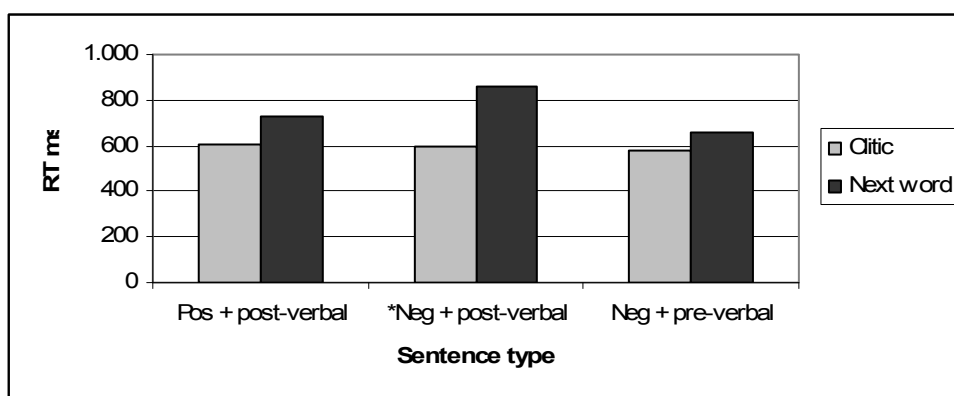


Figure 1. Normal processing pattern per sentence type – RT ms

Next, we examined the RT elicited by the word which follows the pronominal clitic applying the same factorial analysis as reported above. We found a main effect of sentence type ($F(2,29) = 22.867$, $p < .001$) and of pronoun type ($F(1,30) = 68.313$, $p < .001$), and a significant interaction between them ($F(2,29) = 29.519$, $p < .001$). The main effect of sentence type reveals sensitivity to the well-formedness of the tested sentences. The RT elicited by the adverb in the ill-formed negative condition (861ms) is significantly slowed down as compared to the RT elicited by the verb in the well-formed negative sentences (mean 659 ms), and to the RT to the adverb in the well-formed positive sentence (725 ms). The pair-wise comparison between the conditions featuring post-verbal clitics also shows a grammaticality effect on the processing speed. In the well-formed positive sentences, the adverbs are read significantly faster than in the ill-formed negative sentences ($p = .009$). The main effect of pronoun type shows that words following reflexive clitics exhibit longer RTs than words following personal object clitics. The significant interaction between the two factors reveals that the effect of pronoun type disappears in the ill-formed negative condition. There was no difference between RTs elicited by the adverb following either pronoun type when the clitic appears in the phonosyntactically erroneous illegal post-verbal position.

4.2. Broca's aphasics

We performed the same repeated measures factorial analysis (a 3 x 2 sentence type by pronoun type ANOVA) on the mean RT data elicited by the aphasic patients in the critical region of the test sentences, the clitic pronoun and its next word. For the RT data to the clitic pronouns, we found a main effect of pronoun type ($F(1,7) = 5.588, p = .043$), but no effect of sentence type and no interaction between the factors.

Table 3. Reaction time data of the aphasic group per condition

| Sentence Type | Pronoun type | Clitic | | Next word | |
|--------------------|--------------|------------|-----|------------|-----|
| | | mean RT ms | SE | mean RT ms | SE |
| Pos + post-verbal | reflexive | 1269 | 57 | 1524 | 154 |
| | personal | 1215 | 89 | 1421 | 186 |
| *Neg + post-verbal | reflexive | 1446 | 193 | 1635 | 194 |
| | personal | 1423 | 195 | 1707 | 199 |
| Neg + pre-verbal | reflexive | 1243 | 168 | 1519 | 176 |
| | personal | 1266 | 177 | 1362 | 148 |

SE – standard mean error

The main effect of pronoun type and the lack of an interaction with condition reveal that the aphasics take longer to read reflexive clitics as compared to personal object clitics in all conditions. With respect to the factor condition, there is no general differentiation in the RT to clitics in post- and pre-verbal position. The pair-wise comparisons, however, reveal sensitivity to the well-formedness constraint on the position of a clitic in negative sentences. Under negation, pronouns in the clitic cluster are read significantly faster than the misplaced ones ($p = .01$).

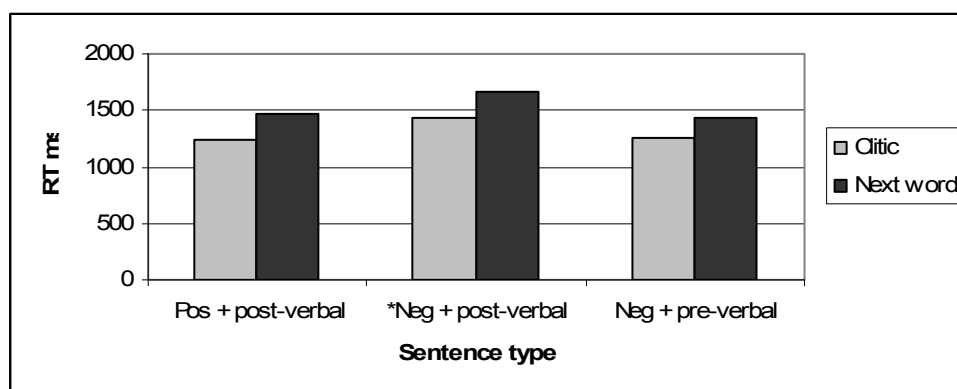


Figure 2. Aphasic processing pattern per sentence type – RT ms

The analysis of the aphasic RT to the word following the pronominal clitics reveals no effect of pronoun type ($F(1,8) = 2.153$, $p = .180$), but a main effect of sentence type on the edge of significance ($F(2,7) = 4.718$, $p = .050$). There is a significant interaction between the two factors ($F(2,7) = 6.535$, $p = .025$). The effect of sentence type is due to the significantly slower RT to the adverb following the clitic in the ill-formed negative sentences as compared to the RT to the verb in the well-formed negative sentences. Within the well-formed sentence types, the presence of negation does not facilitate the RT to the verb as compared to the RT to the adverb in the positive sentences. The significant interaction between the factors pronominal type and sentence type shows that in the well-formed negative condition the aphasic persons take longer to integrate the verb after a reflexive clitic than after a personal object clitic. In the other conditions, and especially in the ill-formed negative condition, the pronominal type does not influence the time the aphasics need to integrate the adverb into the sentential structure.

5. Discussion

Based on the theoretical considerations discussed above, the following predictions can be made about the pattern of normal processing in the investigated sentence types. Firstly, we expect that the response latencies obtained for the critical region of the well-formed negative sentences will be the shortest. In these sentences the pronoun appears in the clitic cluster. This means that the pronoun is overtly realised in the position where the syntactic derivation has put it, namely in front of the verb. The prosodic requirements of the proclitic negation and of the enclitic pronoun are mutually satisfied through cluster formation. In this case prosodic and syntactic cues converge. Sensitivity to the phono-syntactic properties of the clitic cluster increases structure predictability and speeds up lexical access to the verb.

Secondly, with respect to the overt realisation of a lower copy in the ill-formed negative sentences we expect that the split of the clitic cluster will elicit slowed-down RT to the displaced pronoun and to the next word as a reflection of accommodation and recovery processes. This expectation holds for the comparison with the RT elicited by the pronouns in the cluster as well as for the comparison with the RT elicited by the post-verbal pronouns in the positive imperatives.

Thirdly, we expect a 'cluster bonus' in the processing of pronouns and verbs in the well-formed negative imperatives as compared to the processing of pronouns and adverbs in positive imperatives. The positive imperatives represent a construction type in which the mismatch between the enclitisation requirement of the pronoun and the syntactic derivation results in the overt realisation of a lower copy. The transitive verb appears sentence-initially which given the free word order in Bulgarian does not facilitate structural expectations towards a direct object at the clitic position.

For agrammatic processing, our predictions are guided by the assumption that the aphasic patients exhibit a deficit in processing prosodic information and a slowed-down implementation of syntactic operations. Therefore we predict that the pronouns will elicit similar RTs in all sentence types as the realisation of a lower copy does not represent a syntactic violation. However, if the aphasic individuals are sensitive to the phono-syntactic constraints negation imposes on the position of pronominal clitics, but suffer from a timing deficit in the implementation of their prosodic knowledge we expect to find in the critical region a RT pattern similar to that of the control group.

The effects of sentence type revealed by the statistical analysis of the mean RT obtained at the two critical points show that the predictions about normal processing are borne out. The control group process clitic pronouns in the clitic cluster faster than those in a post-verbal position. No RT difference was found between the pronouns in enclitic position despite the well-formedness contrast of the positive and the negative imperatives containing them. Unimpaired participants seemingly do not notice the violation of the phono-syntactic requirement of cluster formation in the presence of negation in sentences featuring an overt realisation of the lower copy. That this is indeed not the case is revealed by the response latencies obtained for the words immediately following the pronominal clitics (see the analysis of the second dependent variable). Compared to the RT elicited by the adverbs in the positive imperatives, the adverbs following the lower copy in the negative imperatives take significantly longer to be read. The slowing down of the response latency after erroneously placed pronouns is indicative of the spill-over effect induced by the increase of processing load through the word order violation. As predicted, the verbs following the clitic cluster elicit the fastest RT due to their high structural predictability.

With respect to the aphasic comprehension data, we observe that the response latencies elicited by the pronominal clitics do not differ in the three sentence types. Although the pronouns elicited the slowest RT in the ill-formed negative imperatives, the difference to the RT in the other two sentence types did not reach significance. Similarly, the aphasic group seems not to profit from the convergence of prosodic and syntactic cues expected to facilitate the integration of the pronouns in the clitic cluster as compared to the low structural predictability of the enclitic pronouns in the positive sentences.

In a sense, all employed sentence types (including the ill-formed one) satisfy the enclitisation requirement of the pronominal clitics, but not all satisfy the cluster formation requirement of the negative clitic. The obtained pattern may be interpreted as evidence that the aphasic speakers do not react to the phono-syntactic properties of the negation marker against the background that the ill-formedness of the post-verbally realised clitics results from the presence of negation. The RT data obtained at the next word, however, shows that the above

interpretation cannot be fully supported. The adverbs in the ill-formed negative sentences yielded the longest mean response latency. It is significantly slower than the one elicited by the verbs in the well-formed negative imperatives. The obtained result mirrors the result from regular processing. This finding indicates that the aphasic participants successfully detected the word order violation. The data obtained for the second variable supports the view that the phono-syntactic requirement of cluster building under negation is still operative in agrammatic comprehension, although in a protracted manner.

This interpretation maybe questioned again taking into account that the aphasic RTs in the well-formed conditions do not pattern with the RTs of the normal group. Importantly, the mean RT elicited by the verbs in the well-formed negative imperatives is not shorter than the mean RT elicited by the adverbs in the positive sentence. If the aphasic participants had indeed preserved knowledge of the phono-syntactic properties of clusters consisting of the negative particle and a direct object clitic, they must profit from the structural expectation that the next word is a verb⁵. This argument has to be weighted against the long known findings that in Broca's aphasia, verb retrieval processes are impaired at the single-word level and at the sentence level. (Berndt et al. 1997, Kim & Thompson 2000). Lexical access is a temporal component reflected in the response latencies obtained in self-paced reading tasks (Bartek et al. 2007). Additional evidence for the impact of lexical retrieval difficulties on the RT elicited by the verb in the well-formed negative imperatives is provided by the significant interaction of the factor pronoun type with that of sentence type. Verbs presented after clitic clusters containing reflexive pronouns yielded significantly longer RT than those presented after clusters containing personal pronouns. The presence of a reflexive pronoun triggers argument reduction of the transitive predicate. Changes in argument structure of the predicate, as well as the interpretative component of co-reference establishment between the reflexive pronoun and the subject of the sentence increase the processing load as is reflected in the longer RT.

The second aim of the paper was to explore differences in the processing of personal and direct object clitic in imperative sentences containing transitive verbs. In the employed task, no explicit reference assignment was required. The stimuli used did not provide any additional contextual information on referents. Therefore, in the present experiment only reflexive pronouns establish a co-reference relation to the virtual addressee of the request by means of syntactic binding. Personal pronouns are prevented from establishing a co-reference relation to the sentential subject on structural grounds and from establishing a co-reference relation to a discourse referent by the lack of contextually available referents. Under these circumstances, the personal pronouns have to be parsed as pure direct object agreement markers.

⁵ Recall the template given in (1).

The control group and the aphasic group show a significant effect of pronoun type on the response latencies of the clitic pronouns. The reflexive clitics elicit slower RT than the personal direct object clitics. Having in mind that syntactically both pronoun types occupy the same position and that the same pattern is obtained in all three sentence types, we can safely conclude that the longer response latencies of the reflexive clitics are associated with an interpretation process which does not take place for the personal clitics. This finding presents new evidence in the scientific discourse concerning different comprehension patterns for reflexive and personal pronouns in agrammatic aphasia and which concerns the assumed sources of such differences: impaired knowledge of syntactic principles and operations or implementation difficulties when a discourse representation has to supplement the syntactic representation for reference establishment. On the one hand, some studies report that agrammatic aphasics exhibit more difficulties in comprehending personal than reflexive pronouns in off-line tests employing truth-value judgement (Grodzinsky et al. 1993, Baauw and Guetos 2003) and in picture-selection tasks (e.g. Ruigendijk et al. 2006). On the other hand, we also find cross-linguistic evidence that aphasic individuals do not experience more difficulties in comprehending personal than reflexive pronouns, both being quantitatively similarly impaired (Edwards & Varlokosta 2007) or similarly preserved (see i.e. Martínez-Ferreiro 2009 and Vasić 2006 for off-line comprehension results from simple transitive sentences).

The results of the present study support the hypothesis that the obtained pattern of clitic processing is based on a slowed-down implementation of narrow syntax knowledge (Burkhardt et al. 2008) in Bulgarian Broca's aphasics. Syntactic binding of reflexive clitics provides for immediate reference establishment. In contrast, personal direct object clitics are parsed as syntactic agreement markers abstracting away from discourse-based reference establishment due to the properties of the employed stimulus sentences. The syntactically triggered interpretation process increased the processing load of reflexive clitics in the normal and in the agrammatic group. Similarly to the unimpaired speakers, the agrammatic group processes personal direct object clitics with greater ease, which is also reflected in the faster integration of the words following personal pronouns in well-formed imperative sentences. The experimental findings thus provide on-line evidence for the influence of differently motivated interpretation processes on the integration of personal and reflexive pronominal clitics into the sentential structure.

6. Conclusion

The aim of the study was twofold. First, we explored normal and agrammatic aphasics' online sensitivity to the phono-syntactic constraints which negation imposes on clitic placement.

Second, we explored differences in the incremental integration of personal and reflexive direct object clitics which we assume to be linked to reference establishment costs. We interpret the obtained results to be indicative of the protracted but still effective manner in which the phonosyntactic operations involved in clitic cluster formation are carried out in the tested agrammatic group. By manipulating the contextual availability of referents we show that personal clitics are processed with relative ease as pure syntactic agreement markers by both groups. Taken together, the results from normal and agrammatic comprehension of negative imperatives in Bulgarian demonstrate that the time-course of the availability of prosodic, syntactic and discourse information is decisive for the successful processing of pronominal clitics.

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