

Nominalization and the problem of indirect access: evidence from Ossetian*

1. Introduction

In this paper, we contribute to the study of non-finiteness by investigating far-reaching consequences of the idea that certain classes of non-finite expressions contain less functional structure than their finite counterparts. If we can establish on empirical grounds that a non-finite configuration α , unlike its finite counterpart α' , does not include projections of functional heads F_1, \dots, F_i , then we can profit from looking at α 's characteristics in two ways. First, we could discover interesting facts about properties of constituents of α : since F_1, \dots, F_i are not there, these properties are expected to be more transparently visible. Secondly, differences between α and α' would tell us a lot about F_1, \dots, F_i and their contribution to the structure and meaning of the whole.

With this general plan in mind, in what follows we want to establish a number of generalizations about what nominalizations can tell us about properties of the verb and verb phrases at early stages of syntactic derivation. We take up a problem referred to in the literature as the Problem of indirect access (Zucchi 1999). Discussing this problem, Kratzer (2003) indicates:

The verbs we see – surrounded by their arguments and with all their inflections tucked on – might not be the verbs that are ultimately fed to the semantic interpretation component... We would have to formulate hypotheses about the meaning of uninflected, tense- and aspectless forms, even though we might never encounter those forms in reality. (Kratzer 2003: 2)

In what follows we argue that a suitable strategy for solving this problem, that is, for identifying true characteristics of verbs and their immediate projections, is to look at syntactic configurations in which clausal functional structure is (at least) partially absent. If it is this functional structure that makes the verb and VP not be transparently visible, then getting rid of it would give us precisely what we want: “the meaning of uninflected, tense- and aspectless forms”.

Below we will explore an idea that nominalizations provide a kind of configuration we are looking for. The huge literature on syntax and semantics of deverbal nominals, including the insightful work by Artemis Alexiadou (2001 *et seq.*), has suggested that they can contain VP and, possibly, a few pieces of functional structure dominating VP, but crucially not the whole set of functional projections characteristic of fully inflected clauses. If we see that properties of the VP in nominalizations are different from those in fully inflected clauses, this can only be due to the functional structure that nominalizations do not contain but clauses do. In this sense, nominalizations offer a more direct access to the characteristics of verbs and VPs.

In light of this idea, we will take a look at Ossetian, an Iranian language spoken in the Caucasus. In Section 2, we examine three sets of data from Ossetian argument supporting nominalizations, to use the term coined by Alexiadou *et al.* 2010: grammatical aspect, eventuality type/aspectual composition, and causative-inchoative alternation. We will see that fully inflected clauses and nominalizations exhibit systematic and predictable differences with

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respect to these characteristics. In Section 3, we propose an account for the observed regularities that consists of two parts. First, we motivate a generalization that properties of nominalizations reflect the quantity of functional structure they embed and propose a hierarchy of functional heads from which those properties can be derived. Secondly, this syntactic analysis is coupled with a model-theoretic fragment, where we put the main burden of explanation on the syntax-semantics interface.

2. Fully inflected clauses vs. nominalizations

2.1. Overview

Properties of nominalizations can be best introduced through an example. In (1), a fully inflected clause comes along with a corresponding nominalization.

- (1) a. čizg dɪx-d-ta qug.
 girl milk-PST-TR.3SG cow
 ‘The girl was milking the cow.’¹
- b. [čyžž-ɪ qug dɪx-d]-ɪ ræštæžɪ zaur ærba-sɪd-i.
 girl-GEN cow milk-PRT-GEN when Z. PRF-go.PST-3SG
 ‘When the girl was milking / milked the cow, Zaur came.’

In (1b), the nominalization occurs as a complement of the temporal postposition *ræštæžɪ* ‘as, when’, lit. ‘at the time of’. The verb stem *dɪx-* in (1b) is combined with the nominal morphology (the *-d* affix, which deverbal nouns share with passive participles); the derived nominal receives the genitive case from the postposition. The internal argument in (1b) retains the same case marking as in (1a), while the external argument appears in the genitive.²

With this in mind, in the subsequent sections we will show that fully inflected clauses and corresponding nominalizations contrast sharply as to a number of semantic and syntactic characteristics.

2.2. Grammatical aspect

The verbal system of Ossetian is organized around the basic morphological distinction between prefixed and non-prefixed verb stems. A number of illustrations is given in Table 1.

Table 1. Prefixed and non-prefixed verb stems.

Non-prefixed	Prefixed
fɪššɪn ‘write’	nɪ-ffɪššɪn ‘write down’
kæuɪn ‘cry’	š-kæuɪn ‘start crying’
sæuɪn ‘move’	ær-sæuɪn ‘come’
žarɪn ‘sing’	ba-žarɪn ‘start singing’

¹ The following abbreviations are used throughout the paper: 3 3rd person, ABL ablative, ALL allative, DAT dative, GEN genitive, INF infinitive, INTR intransitive declension, PL plural, PRF prefix, PRS present, PRT participle, PST past, SG singular, TR transitive declension.

² Apart from the pattern shown in (1b), Ossetian makes use of nominalizations derived from what traditional grammars call the infinitive:

- (i) [čɪzž-ɪ qug dus-in]-ɪ ræštæžɪ zaur ærba-sɪd-i.
 girl-GEN cow milk-INF-GEN when Z. PRF-go.PST-3SG
 ‘When the girl was milking the cow, Zaur came.’

In all respects relevant for the plot of this paper both types of nominalizations behave in the same way. In what follows, we limit our attention to *-d* nominalizations like that in (1b). What we will say extends to infinitival nominalizations as well.

In the indicative, Ossetian distinguishes between past, present and future tenses; the past tense comes in two varieties, transitive and intransitive, their choice being determined by the transitivity feature of the verb stem, see, e.g., Abaev 1964.

The first observation is that prefixed and non-prefixed verbs, if occur in fully inflected clauses, exhibit completely different ranges of aspectual interpretations. Prefixed and non-prefixed variants of the stem ‘milk’ are illustrated in (2)–(3).

- (2) a. čičg dus-ı qug.
 girl milk.PRS-3SG cow
 1. ‘The girl is milking the cow.’
 2. ‘The girl milks the cow.’
- b. čičg dıx-d-ta qug.
 girl milk-PST-TR.3SG cow
 1. ‘The girl was milking the cow.’
 2. ‘The girl used to milk the cow.’
 3. *‘The girl milked the cow.’
- (3) a. čičg ra-dus-ı qug.
 girl PRF-milk.PRS-3SG cow
 1. *‘The girl is milking the cow.’
 2. ‘The girl (regularly) milks the cow.’
- b. čičg ra-dıx-d-ta qug.
 girl PRF-milk-PST-TR.3SG cow
 1. *‘The girl was milking the cow.’
 2. *‘The girl used to milk the cow.’
 3. ‘The girl milked the cow.’

Examples in (2) show the present and past forms of the non-prefixed verb ‘milk’: in terms of grammatical aspect, both (2a) and (2b) have the same range of interpretations — progressive and habitual. The prefixed variant in (3) is different: (3b) yields the perfective interpretation, disallowing either progressive or habitual readings; (3a) can only refer to repetitions of complete milking events but not to ongoing events. This is summarized in Table 2.

Table 2. Range of aspectual interpretations

	Present	Past
Non-prefixed	progressive habitual	progressive habitual
Prefixed	habitual	perfective

Abstracting away from the habitual interpretation, not discussed below, one can identify the crucial property of Ossetian aspectual system: progressive and perfective interpretations are complementarily distributed between prefixed and non-prefixed stems. In this respect, Ossetian resembles a number of Slavic languages, e.g. Russian, with its “aspectual pairs” that are essentially similar to *dus-/ra-dus-* in (2)–(3).

Things are different for nominalizations. While prefixed stems still produce the perfective interpretation, their prefixless counterparts appear to be aspectually neutral, that is, compatible with whatever aspectual construal.

To identify aspectual characteristics of nominalizations we combine them with two temporal postpositions *raštæž* ‘at the time of’ and *fæštæ* ‘after’ and make the resulting PP a temporal modifier of a perfective clause.

If the postposition *ræštæžī* takes an *imperfective* nominalization as its complement, we expect that it picks out a reference time *t* that is *included* in the running time $\tau(e)$ of the event referred to by the nominalization. As a result, the time of the event in the perfective main clause will be included in *t* and $\tau(e)$ as well. Examples in (4) show that only the nominalization based on a non-prefixed stem is available in this configuration. Whereas in (4a) coming occurs in the midst of milking, this is not an option for (4b).

- (4) a. čīžž-1 qug dīx-d-1 ræštæžī zaur ærba-sīd-i.
 girl-GEN cow milk-PRT-GEN at.the.time.of Z. PRF-come.PST-3SG
 ‘When the girl was milking the cow, Zaur came.’
- b. čīžž-1 qug ra-dīx-d-1 ræštæžī zaur ærba-sīd-i.
 girl-GEN cow PRF-milk-PRT-GEN at.the.time.of Z. PRF-come.PST-3SG
 1. *‘When the girl was milking the cow, Zaur came.’
 2. ‘At the time when the girl had already milked the cow, Zaur came.’

(4a-b) thus show that the prefixed nominalization, like its fully inflected counterpart in (3), is incompatible with the progressive/imperfective viewpoint aspect. The non-prefixed nominalization, in contrast with a corresponding clause, does allow the perfective viewpoint aspect, however. To see this, let us merge a nominalization as a complement of the postposition *fæštæ* ‘after’. This postposition refers to a time that follows the reference time *t* denoted by the nominalization. If the nominalization has the perfective interpretation, *t* would *include* the event time. The resulting reading would be that the coming event occurs after a complete milking event $\tau(e)$. Examples (5a-b) show that both prefixed and non-prefixed nominalizations are licit in such a temporal configuration.

- (5) a. čīžž-1 qug dīx-d-1 fæštæ zaur ærba-sīd-i.
 girl-GEN cow milk-PRT-GEN after Z. PRF-come.PST-3SG
 ‘After the girl had milked the cow, Zaur came.’
- b. čīžž-1 qug ra-dīx-d-1 fæštæ zaur ærba-sīd-i.
 girl-GEN cow PRF-milk-PRT-GEN after Z. PRF-come.PST-3SG
 ‘After the girl had milked the cow, Zaur came.’

What we see in (4) and (5), therefore, is that prefixed nominalizations entail the perfective grammatical aspect, precisely as what happens in fully inflected clauses. (In the literature on prototypical “aspectual” languages like Slavic, e.g., Verkuyl 1999, Paslawska, von Stechow 2003 and references therein, such effects are commonly associated with the AspP functional projection, see Section 3.4 for further discussion.) Prefixless nominalizations are different: they do not entail the imperfective aspect, being compatible with the perfective aspectual viewpoint as well.

2.3. Eventuality type and aspectual composition

So far, we have seen that prefixed stems create perfective clauses. In this section, we will observe two other properties of such stems: obligatory telicity and Slavic type of aspectual composition.

The first thing to note is that perfective clauses based on prefixed stems are obligatorily telic, as illustrated in (6)–(7):

- (6) a. čīžg iw šahat-mæ ra-dīx-d-ta qug.
 girl one hour-ALL PRF-milk-PST-TR.3SG cow
 ‘The girl milked the cow in an hour.’
- b. *čīžg iw šahat-1 ra-dīx-d-ta qug.

girl one hour-GEN PRF-milk-PST-TR.3SG cow
 ‘The girl milked the cow for an hour.’

- (7) a. čizg iw šaxat-mæ a/ær-las-ta zoniɤ.
 girl one hour-ALL PRF-pull.PST-TR.3SG sleigh
 ‘The girl pulled the sleigh away/in in an hour.’
 b. *čizg iw šaxat-ɪ a/ær-las-ta zoniɤ.
 girl one hour-GEN PRF-pull.PST-TR.3SG sleigh
 ‘The girl pulled the sleigh away/in for an hour.’

Whatever type of event description we take, in prefixed clauses it can only yield a telic interpretation. (6a) describes a culminating milking event, and in (7a), a prefix introduces either a source or goal of motion that measure out the progress of the event and leads to telicity. In this respect, Ossetian differs drastically from languages like English, where predicates like ‘milk the cow’ create telic perfective clauses (cf. *She milked the cow in ten minutes*), while ‘pull the sleigh’ occurs in atelic perfective clauses (cf. *She pulled the sleigh for an hour*). In Ossetian, therefore, prefixation destroys the potential for an atelic interpretation.

Related to the obligatory telicity is a peculiarity of aspectual composition. In languages like English, incremental verbs combined with cumulative arguments (e.g., bare plural and mass DPs) produce atelic complex verbal predicates, whereas quantized arguments give rise to telic event descriptions (Krifka 1989, 1992, 1998). Unlike in English, but again in much the same way as in Russian (Krifka 1992, Filip 1999, 2005, Verkuyl 1999; see also Piñon 2001 for Polish), reference properties of arguments in Ossetian do not affect those of event predicates. The other way round, obligatory telicity of complex verbal predicates restricts the interpretation of the incremental argument:

- (8) alan ba-xor-d-ta baš.
 A. PRF-eat-PST-TR.3SG soup
 ‘Alan ate up [the / *∅ soup].’

Undetermined arguments of prefixed incremental verbs based on mass nouns, e.g., ‘soup’ in (8), can not receive a bare (indefinite) interpretation. It must refer to a specific quantity of soup established in the universe of discourse, and (8) entails that all of it has been consumed in the course of the event.

Both obligatory telicity and Slavic-type aspectual composition are preserved in nominalizations based on prefixed stems. Examples in (9)–(10) show nominal configurations corresponding to fully inflected clauses in (6) and (8).

- (9) a. čizž-ɪ iw šahat-mæ qug ra-dɪx-d-ɪ fæštæ...
 girl-GEN one hour-ALL cow PRF-milk-PRT-GEN after
 ‘After the girl milked the cow in an hour...’
 b. *čizž-ɪ iw šahat-ɪ qug ra-dɪx-d-ɪ fæštæ...
 girl one hour-GEN cow PRF-milk-PRT-GEN after
 Int.: ‘After the girl spent an hour milking the cow...’
- (10) alan-ɪ baš ba-xor-d-ɪ fæštæ...
 A.-GEN soup PRF-eat-PRT-GEN after
 ‘After Alan ate up [the / *∅ soup]...’

Comparing (6) with (9) and (8) with (10) one can observe that both are telic and that the incremental theme must refer to a specified quantity of soup. Prefixed clauses and

nominalizations do not manifest any difference in terms of eventuality type and aspectual composition.

Anticipating the discussion in Section 3.2–3.3, we cannot but point out that characteristics discussed above indicate that the structure has to contain AspP. Alexiadou et al. (2010) discuss various nominalizations from Romanian, Spanish, English, and Slavic languages focusing on their aspectual differences. They argue that the Romanian supine and English verbal gerund (or acc-ing nominalization in Abney’s 1987 terms) do contain the AspP projection. Ossetian prefixed nominalizations discussed here can, therefore, be analyzed along similar lines, the main difference being the feature value of Asp: imperfective in Romanian and English, perfective in Ossetian.³

Let us now look at prefixless nominalizations, which, as we have seen in Section 2.2, are aspectless. The relevant data comes with examples like (11).

- (11) a. čičž-1 iw minut-mæ qug dıx-d-1 fæštæ...
 girl-GEN one minute-ALL cow milk-PRT-GEN after
 ‘After the girl milked the cow in a minute...’
 b. čičž-1 iw minut-1 qug dıx-d-1 fæštæ...
 girl one minute-GEN cow milk-PRT-GEN after
 ‘After the girl spent a minute milking the cow...’

Examples in (11a-b) involve the *fæštæ* postposition, which, as we have already seen, favors the perfective construal, whereby the event is introduced as complete, not ongoing. In this respect (11a-b) are exactly the same as (5b) above. But examples in (11) reveal a crucial fact: even if the overall construal is perfective, prefixless nominalizations do not entail telicity. Whereas (11a) is telic and refers to a culminating milking event, (11b) is atelic: it describes milking activity that terminates before the culmination is reached.

Furthermore, prefixless nominalizations provide crucial evidence as to what aspectual composition looks like if the prefix is not there. To see this, we again need to look at their characteristics under the perfective construal (unavailable, as we saw in (2b), for their fully inflected counterparts). The pattern is illustrated in (12).

- (12) alan-1 baš xor-d-1 fæštæ...
 A.-GEN soup eat-PRT-GEN after
 1. ‘After Alan ate the soup (in two minutes)...’
 2. ‘After Alan ate soup (for two minutes)...’

Unlike for prefixed nominalizations, for ‘eating (the) soup’ in (12), even if the nominalization is perfective, it is not the case that the reference properties of the internal argument are restricted. ‘Soup’ can either be interpreted as referring to a specific quantity of soup or receive an indefinite interpretation. This difference corresponds to the difference in telicity: the indefinite reading of DP obtains in the atelic (12.2) while the definite interpretation comes along with telicity in (12.1). This pattern of aspectual composition is identical to that in English and similar languages, cf. English translations of (12).⁴

³ It should be noted as well that in Ossetian, like in Slavic languages discussed by Alexiadou et al. 2010, nominalizations accept plural morphology, hence contain both Asp and ClassP — NumP:

(i) qug dıx-d-t-1 fæštæ...
 cow milk-PRT-PL-GEN after
 ‘After milking the cow a few times...’

⁴ Evidence from aspectual composition in prefixless nominalizations like (12) is crucial for our purposes, since this is the only configuration that allows us to see what happens if the prefix is absent, but the viewpoint aspect is perfective. It is in such a setting where aspectual compositional properties of a prefixless predicate are fully

Here is an interim summary of our observations. Nominalizations based on prefixed stems resemble fully inflected clauses as to their grammatical aspect (perfective), telicity (telic) and aspectual composition (Slavic-type). Non-prefixed nominalizations differ radically from both fully inflected clauses and corresponding prefixed nominalizations. First, they are aspectually neutral and compatible with both perfective and imperfective construals. Secondly, under the perfective construal they show variable telicity. Thirdly, they provide evidence that if the prefix is not there, aspectual composition is of the English type.

2.4. Causative-inchoative alternation

We have not yet detected any differences between prefixed nominalizations and corresponding fully inflected clauses. In this section we will see that such differences do exist. They have to do with the causative-inchoative alternation, whereby the same verb occurs in both transitive and intransitive clauses.

Examples in (13)–(14) demonstrate clauses based on prefixed verbs *štavm* ‘heat, warm up’ and *a-c’æl kæn m* ‘break’. Both of them can only yield a transitive configuration:

- (13) a. Alan š-tæv-d-ta baš.
 A. PRF-heat-PST-TR.3SG soup
 ‘Alan heated the soup.’
 b. *baš š-tæv-d-ta / š-tæv-d-i.
 soup PRF-heat-PST-TR.3SG PRF-heat-PST-INTR.3SG
 ‘The soup heated.’

- (14) a. Alan jæ mašinæ a-c’æl kod-ta.
 A. his car PRF-broken make.PST-TR.3SG
 ‘Alan broke his car.’
 b. *mašinæ a-c’æl kod-ta / a-c’æl kod-i.
 car PRF-broken make.PST-TR.3S PRF-broken make.PST-INTR.3S
 ‘The car broke.’

Verbs like ‘warm up’ and ‘break’ are result verbs in terms of Rappaport Hovav, Levin (1998 and elsewhere): they specify the result state attained by the internal argument which is induced by an underspecified activity performed by the external argument. Crosslinguistically, it is this class of verbs that tends to show the causative-inchoative alternation. However, as (13)–(14) illustrate, this does not happen to prefixed verbs like *š-tavm* ‘warm up’ and *a-c’æl kæn m* ‘break’ in Ossetian.

Nominalizations exhibit a completely different behaviour: both transitive and intransitive configurations are readily available.

revealed. In corresponding fully inflected clauses, one has little chance to observe the correlation between telicity and interpretation of the incremental argument. Being obligatorily imperfective, prefixless clauses only combine with durative adverbials like ‘for two hours’, no matter what the interpretation of the internal argument is:

- (i) alan iw minut-ı xor-d-ta baš.
 A. one minute-GEN eat-PST-TR.3SG soup
 ‘Alan has been eating [the / Ø soup] for one minute.’
 (ii) *alan iw minut-mæ xor-d-ta baš.
 A. one minute-ALL eat-PST-TR.3SG soup
 ‘Alan has been eating [the / Ø soup] in one minute.’

Therefore, what matters for the plot of our story is the fact that prefixless nominalizations, but not prefixless fully inflected clauses reveal the true character of aspectual composition in the absence of the prefix. See Section 3.3 for further discussion and elaboration.

- (15) a. Alan-₁ baš š-tæv-d-₁ fæštæ...
 A.-GEN soup PRF-heat-PRT-GEN after
 ‘After Alan heated the soup...’
- b. baš-₁ š-tæv-d-₁ fæštæ...
 soup-GEN PRF-heat-PRT-GEN after
 ‘After the soup heated...’
- (16) a. Alan-₁ mašinæ a-c’æł kond-₁ fæštæ...
 A.-GEN car PRF-broken make.PRT-GEN after
 ‘After Alan broke his car...’
- b. mašinæ-j₁ a-c’æł kond-₁ fæštæ...
 car-GEN PRF-broken make.PRT-GEN after
 ‘After the car broke...’

It should be emphasized that in (15b)–(16b) we are dealing with a true intransitive configuration that lacks the external argument altogether, not with a transitive configuration where the external argument has no overt realization. To see this, let us look at (17a) where an adjunct referring to the natural force occurs and at (17b) containing *jæxædæg* ‘by itself’. As (17a-b) illustrate, neither adjunct is licensed in a transitive clause:

- (17) a. *Alan š-tæv-d-ta baš xur-æj.
 A. PRF-heat-PST-TR.3SG soup sun-ABL
 ‘Alan heated the soup from the sun.’
- b. *Alan mašinæ jæxædæg a-c’æł kod-ta.
 A. car by.itself PRF-broken make.PST-TR.3SG
 ‘Alan broke his car by itself.’

In contrast, in (18) both adjuncts are combined with a true intransitive (unaccusative) verb *aχuiššin* ‘go out (of a fire)’ without producing an ungrammatical outcome:

- (18) a. art dimgæ-jæ a-χuišš-id-i.
 fire wind-ABL PRF-go.out-PST-3SG
 ‘The fire went out from the wind.’
- b. art jæxædæg a-χuišš-id-i.
 fire by.itself PRF-go.out-PST-3SG
 ‘The fire went out by itself.’

In (17a)–(18a), the adjunct introduces the natural force ‘sun’/ ‘wind’ as a sole cause of the change of state of the theme. In (17b)–(18b), ‘by itself’ indicates that no external force is responsible for bringing about the change of state. Modifiers of this type are licit the intransitive (unaccusative), but not in the transitive environment.

Nominalizations in (19a) and (19b) corresponding (15b) and (16b) respectively do license adjuncts of this type:

- (19) a. baš-₁ xur-æj š-tæv-d-₁ fæštæ...
 soup-GEN sun-ABL PRF-heat-PRT-GEN after
 ‘After the soup heated from the sun...’
- b. mašinæ-j₁ jæxædæg a-c’æł kond-₁ fæštæ...
 car-GEN by.itself PRF-broken make.PRT-GEN after
 ‘After the car broke by itself...’

Evidence from (19), where the distribution of adjuncts patterns with unaccusatives in (18), not with transitives in (17), suggests that nominalizations allow for the genuine intransitive construal. Therefore, unlike fully inflected clauses, nominalizations do exhibit the causative-inchoative alternation. This is true of both nominalizations based on the prefixed stems in (19) and for their non-prefixed counterparts. For the sake of space we leave out corresponding examples which are fully identical to (19) except for the prefix.

Let us take stock of what we have observed so far. We have identified three parameters of variation between fully inflected clauses and nominalizations. These are grammatical aspect, eventuality type/aspectual composition and transitivity alternations. We have observed that prefixed and non-prefixed stems exhibit different possibilities with respect to these parameters. Non-prefixed stems are imperfective in fully inflected clauses but aspectually neutral in nominalizations. Prefixed stems, in contrast, show the same perfective aspect in both configurations. Being perfective, prefixed stems uniformly manifest obligatory telicity and Slavic-type aspectual composition. Non-prefixed stems are again different: even if the perfective interpretation of the nominalization is forced, they do not entail telicity, and exhibit English-type aspectual composition. Fully inflected clauses and nominalizations based on prefixed stems differ in terms of transitivity: even if a clause is obligatorily transitive, a corresponding nominalization allows both transitive (causative) and intransitive (inchoative) configurations. This is summarized in Table 3.

Table 3. Fully inflected clauses vis-à-vis nominalizations

	Fully inflected clause	Prefixed nominalization	Non-prefixed nominalization
Grammatical aspect	specified	specified	not specified
Aspectual composition	Slavic	Slavic	English
Transitivity	transitive	alternation	alternation

What the data in Table 3 seem to show is: nominalizations systematically produce a wider range of semantic and syntactic options than fully inflected clauses. They allow us to see a wider range of aspectual interpretations, a wider range of eventuality types, and a wider range of argument structures. We get the least restricted set of available possibilities if the structure does not contain the prefix. If the nominalization is based on a prefixed stem, aspectual characteristics are narrowed down, but transitivity is not. The tentative generalization emerging at this point is: the more functional structure we get, the more restricted syntactically and semantically our configuration is. If nominalizations in general possess less functional structure than fully inflected clauses, and prefixless nominalizations – less functional structure than prefixed ones, the pattern in Table 3 is what we can expect. What we need, then, is an elaborated analysis of the structure of nominalizations making explicit their differences from fully inflected clauses, from which the precise distribution of prefixed and non-prefixed stems in Table 3 can be derived. To developing such an analysis we now turn.

3. Analysis

In accounting for the puzzles outlined above we take the following steps. First, we formulate our assumptions about the structure of nominalizations. Secondly, we show that nominalizations in Ossetian involve an articulated structure including at least ν P. Thirdly, we present our hypothesis about the hierarchy of functional heads in Ossetian. Fourthly, we develop a model-theoretic fragment accounting for the interpretation of relevant syntactic projections. Finally, we show how these ingredients together explain the observed differences between fully inflected clauses and nominalizations.

3.1. Structure of nominalizations

Following much recent work (Alexiadou 2001, 2005, 2010, Fu et al. 2001, van Hout, Roeper 1998, Roeper 1987, 2004, Harley 2009) we assume that nominalizations are built syntactically, whereby a certain piece of structure containing a verb merges as a complement of the nominalizing head:

(20) [DP ... [NP [... V ...] [N NMN]] ...]

The crucial question this view of nominalizations rises is what amount of structure is embedded under the nominal head.⁵ Existing studies of deverbal nominals (e.g., Abney 1987, Alexiadou 2001, 2009, Harley 2009, Alexiadou *et al.* 2010) suggest clearly that the answer to this question is subject to a huge intra- and cross-linguistic variation. Therefore, our first task is to identify a relevant syntactic configuration in Ossetian on empirical grounds.

The common diagnostic for the structure of deverbal nominals involves co-occurrence with adverbials. If different types of adverbials merge at different levels of the clausal structure (Cinque 1999, Ernst 2002, a. m. o.), looking at what adverbials can and cannot be combined with nominalizations allows to determine the internal constitution of the latter. Examples in (21) show a nominalization in combination with rate, agent-oriented and epistemic adverbs. We follow Radford 1997, Costa 2004, Thompson 2005, Alexiadou 2009, a.o., in assuming that these adverbials adjoin to VP, *v*P and TP, respectively.

- (21) a. čičž-1 taɕd qug dɪx-d-1 fæštæ...
 girl-GEN quickly cow milk-PRT-GEN after
 ‘After the girl milked the cow quickly...’
- b. Alan-1 baræj mašinæ a-c’æɫ kond-1 fæštæ...
 A.-GEN on.purpose car PRF-broken make.PRT-GEN after
 ‘After Alan broke the car on purpose...’
- c. *alan-1 ævæccægæn fætqui-tɪ ba-xor-d-1 fæštæ...
 A.-GEN evidently apple-PL PRF-eat-PRT-GEN after
 ‘After Alan, evidently, ate the apples up...’

We see from (21) that rate and agent-oriented adverbials are grammatical whereas the epistemic one is not. This clearly suggests that, first, nominalizations in Ossetian embed not just V^0 , but a phrasal structure projected by the verb, and secondly, that this structure contains at least *v*P but does not contain TP.

Another evidence suggesting that the finite T is absent in nominalizations comes from the case marking of the subject: in nominalizations, the subject receives the genitive case marking identical to that of the possessor within DP:

- (22) a. Alan nin xæst-1 tɪxxæj razɪr-d-ta.
 A. us war-GEN about tell-PST-TR.3SG
 ‘Alan told us about the war.’
- b. Alan-1 tauræɕ xæst-1 tɪxxæj

⁵ Alexiadou *et al.* (2010) show that cross-linguistically nominalizations differ as to whether a (possibly extended) projection of the verb merges with a noun head (little *n*, in their terms) or is directly embedded under D. The external syntax of nominalizations is not our focus here; in what follows we assume that (20) (which is a notational variant of Alexiadou *et al.*'s (2010) little *n* structure) as a working hypothesis. One reason to believe that (20) is a right analysis for nominalizations in question has to do with the number marking. Many nominalizations in Ossetian, especially based on accomplishment and achievement verbal predicates, can appear with plural morphology under appropriate semantic conditions (see footnote 3). To the extent that nominalizations do not license plural marking if a verbal projection directly merges with D (Alexiadou *et al.* 2010), this fact indicates that the structure contains nominal projections embedded under D, as in (20).

- A.-GEN story war-GEN about
 ‘Alan’s story about the war’
- c. Alan-1 xæst-1 tıxxæj razır-d-1 fæštæ...
 A.-GEN war-GEN about tell-PRT-GEN after
 ‘After Alan told about the war...’

If the nominative case assignment in (22a) is a property of the finite T, then (22c) indicates that this head is absent in deverbal nominals. Instead, there are good reasons to believe (see, e.g., Rappaport 2001 who makes a similar case for Slavic languages) that in (22c), on a par with (22b), the case assigner responsible for the genitive marking is D (or whatever other nominal functional head our favorite theory tells us, e.g., Poss).

A similar line of reasoning applies to the case marking of the direct object. Ossetian is a language with the differential object marking, the choice being determined by a number of factors such as animacy, referentiality, topicality, etc. The crucial generalization is that whatever case marking is chosen for the finite clause, a corresponding nominalization have the same (see, e.g., (1) above). To the extent that the direct object is case-assigned by the transitive *v* introducing the external argument (or by Voice, if one assumes an architecture where *v* is a verbalizer corresponding to the lower V in the split-VP system, with Voice taking *v*P as its complement; see Harley 2009: 335–336), *v*P must be present in nominalizations in question.⁶

3.2. Functional structure

So far we have seen that there are good reasons to believe that nominalizations we are looking at contain at least *v*P. The next question is what kind of other functional structure, if any, can be embedded, either obligatorily or optionally, under the nominal head. This is where our observations from Section 2 come into play.

We have established in Section 2 that nominalizations and fully inflected clauses are associated with two bulks of systematic differences. First, they differ in terms of perfectivity, eventuality type and aspectual composition. Secondly, they have diverse argument structure characteristics. Most significantly, the variation along these two dimensions is partially independent, as the data in Table 3 above indicate: whether the nominalization differs from a fully inflected clause in terms of argument structure does not depend on whether it also differs as to its aspect/eventuality type/aspectual composition. (Thus, nominalizations based on prefixed stems look like fully inflected clauses in terms of aspectual characteristics, but not in terms of transitivity.) If so, we have good reasons to suggest that aspect / eventuality type / aspectual composition and argument realization are related to at least two distinct pieces of functional structure, call them F1 and F2. Since *v*P is what clauses, prefixed, and prefixless nominalizations share, observed differences cannot be traced back to any properties of *v*P. This means that F1 and F2 must merge outside *v*P:

$$(23) \quad [F2P \ F2 \ \dots \ [F1P \ F1 \ \dots \ [vP \ \dots \]]]$$

By hypothesis, the more clausal functional structure is included in the nominalization, the more that nominalization resembles the fully inflected clause. If the nominalization lacks F1 and F2 altogether, it will not manifest effects associated with these functional heads. If it only contains F1, we expect that the contribution of F2 will not show up.

With this in mind, let us look again at data in Table 3, repeated here as Table 4.

Table 4. Fully inflected clauses vis-a-vis nominalizations

	Fully	inflected	Prefixed	Non-prefixed
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⁶ Lyutikova and Tatevosov (2011) discuss nominalizations in Ossetian that involve constituents smaller than *v*P. Such nominalizations are not directly relevant to our current story.

related to argument realization. Given the Occam’s razor, however, in the absence of a strong evidence that such a head is empirically real we are inclined to keep the vocabulary of functional heads to minimum. Specifically, we identify F2 with the finite T, the head that is not to be admitted in nominalizations for independent reasons (see Section 3.1) but must be found in any finite clause.

Therefore, the hierarchy of functional heads minimally required for explaining our nominalization puzzles looks like (28).

$$(28) \quad [_{CP} C \dots [_{TP} T \dots [_{AspP} Asp \dots [_{vP} \dots]]]]$$

One good consequence of assuming this hierarchy is that we do not need to stipulate any peculiar functional heads for Ossetian: the same or similar hierarchy has been independently argued for in the literature. The only specific syntactic assumption we have to make is what structure can be embedded under the nominalizing head in Ossetian. Nominalizations include vP. They do not include TP, hence the difference between nominalizations and fully inflected clauses in terms of transitivity. They optionally include AspP, hence the differences between prefixed and non-prefixed nominalizations in terms of aspectual properties. These basic options are illustrated in (29).

$$(29) \quad [_{CP} C \dots [_{TP} T \dots [_{AspP} Asp \dots [_{vP} \dots]]]]$$

$[_{vP} \dots]]$
non-prefixed
nominalization

prefixed nominalization

So far we have identified the syntactic makeup of nominalizations and put forward a basic hypothesis accounting for where their peculiarities come from. However, to make this proposal work we have to develop a detailed account for the function of different pieces of structure (most significantly, Asp and T) involved in the derivation. In what follows we present a model-theoretic fragment making explicit our analysis of the interpretation of vP, AspP and TP. In doing so, we put the burden of explanation on the syntax-semantics interface.

Essentially, we assume a syntactic view of event structure (e.g., Harley 1995, Folli 2002, Ramchand 2008, Travis 2010), whereby the content of a complex verbal predicate is determined by the syntactic configuration in which the verb appears. In the fragment below, each syntactic head is assigned an interpretation that contributes to the overall semantic makeup of the predicate.

3.3. Deriving Asp effects

In this section, we set out our account for Asp effects. First and foremost, we are interested in deriving vP denotations for sentences like (8) and corresponding nominalizations in (10) and (12): an explanation provided for the perfective aspect, obligatory telicity and Slavic-type aspectual composition of such sentences and nominalizations naturally extends to other cases discussed in Sections 2.2–2.3.

The starting point is the VP: the denotation of V^0 , which is a four-place relation between two individuals and events in (30), combines with a denotation of the direct object DP yielding a VP denotation. We assume that, like in many other languages lacking overt determiners, undetermined DPs are ambiguous (at least) between definite and indefinite interpretations. Accordingly, we analyze the DP *baš* ‘soup’ based on the mass noun ‘soup’ as denoting either an individual in (31a) or a generalized quantifier in (31b).

$$(30) \quad \parallel [_{v} \text{ xær- }] \parallel = \lambda y \lambda x \lambda e \lambda e' [\text{activity}(e) \wedge \text{agent}(x)(e) \wedge \text{cause}(e')(e) \wedge \text{eat}(e') \wedge \text{theme}(y)(e')]$$

- (31) a. $\| [\text{DP } \sigma\text{-baš}] \| = \sigma x.\text{soup}(x)$,
 where σP is the maximal individual in the extension of P if P happens to contain such an individual, undefined otherwise (e.g., Link 1983).
 b. $\| [\text{DP } \emptyset\text{-baš}] \| = \lambda R_{\langle e, vt \rangle} \lambda e \exists x [R(x)(e) \wedge \text{soup}(x)]$

Let us first see the derivation of the vP based on the definite DP denotation in (31a). Combining (31a) with (30) yields a VP denotation in (32).

- (32) $\| [\text{VP } x\text{ær- } \sigma\text{-baš}] \| = \lambda x \lambda e \lambda e' [\text{activity}(e) \wedge \text{agent}(x)(e) \wedge \text{cause}(e')(e) \wedge \text{eat}(e') \wedge \text{theme}(\sigma x.\text{soup}(x))(e')]$

In (32), VP is a relation between individuals and two events, the causing activity subevent and the caused change-of-state subevent. This decomposition follows main ideas in Ramchand 2008 and especially Rothstein 2004, who argues extensively that predicates like *eat* and *read* are to be decomposed into activity and change of state (=become) subevents. Although in Rothstein's system the relation between the subevents is incremental rather than causal,⁷ in (30) and (32) we stick to CAUSE, considering it as a kind of default choice in the literature on predicate decomposition going back to Dowty's (1979) analysis of accomplishments. Nothing in our argumentation builds on this choice, however, so the reader can think of his favorite relation in place of cause in (22). What matters here is the very fact that predicates we are interested in are characterized by subevental complexity.

More essential for our purposes is the assumption that both event arguments in (32) are "active" at this stage of derivation and are accessible for further semantic operations. The significance of this assumption will be fully revealed in Section 3.4, where the derivation of the causative-inchoative alternation is discussed. At the moment, however, we only need to deal with transitive clauses.

We suggest, then, that one of event variables gets existentially bound when the VP merges with v . (33) shows a denotation of the transitive v_{caus} (we will discuss its intransitive counterpart v_{anticaus} shortly).

- (33) $\| v_{\text{caus}} \| = \lambda S_{\langle e, \langle v, \langle v, t \rangle \rangle} \lambda x \lambda e \exists e' [S(x)(e')(e)]$

Combining the denotation of v_{caus} with the denotation of its complement VP creates a relation between individuals and events in (34).

- (34) $\| [v \ v_{\text{caus}} [\text{VP } x\text{ær- } \sigma\text{-baš}]] \| = \lambda x \lambda e \exists e' [\text{activity}(e) \wedge \text{agent}(x)(e) \wedge \text{cause}(e')(e) \wedge \text{eat}(e') \wedge \text{theme}(\sigma x.\text{soup}(x))(e')]$

Merging the external argument in the Spec- vP position produces a vP denotation in (35), which is a property of events e such that e is an event, of which Alan is the agent, that causes the soup getting eaten.

⁷ Rothstein argues that subevents are related by a contextually salient function μ mapping any element e of the incremental chain defined on the become subevent to a part of the activity subevent $\mu(e)$, provided that $\mu(e)$ and e have identical running times. Rothstein emphasizes that the relation established by μ cannot be reduced to mere causation. It should be pointed out, however, that e is counterfactually dependent on $\mu(e)$: if $\mu(e)$, say, is a part of the eating activity and e is a temporally coextensive part of the subevent in which the theme is getting eaten, then the latter could not have occurred if the former had not. To the extent that counterfactual dependence is an essential ingredient of the causation (Lewis 1973 and much further literature), there are reasons to believe that a certain flavor of causality can be detected in Rothstein's incremental relation. We are grateful to Chris Piñon for encouraging us to discuss this point.

$$(35) \quad \llbracket [\nu_P \text{ alan } [\nu' \nu_{\text{caus}} [\nu_P \text{ xær- } \sigma\text{-baš }]]] \rrbracket = \lambda e \exists e' [\text{activity}(e) \wedge \text{agent}(\text{alan})(e) \wedge \text{cause}(e')(e) \wedge \text{eat}(e') \wedge \text{theme}(\sigma x.\text{soup}(x))(e')] \stackrel{\text{df}}{=} \text{EAT_THE_SOUP}$$

The derivation of the ν_P denotation based on the indefinite direct object in (31b) proceeds in much the same way except for one thing. Since the indefinite DP is not of individual type e , but of the generalized quantifier type $\langle\langle e, vt \rangle, vt \rangle$, it cannot be interpreted in situ. Instead, it undergoes QR leaving a trace, a variable of type e , with a subsequent λ -abstraction over this variable in the standard manner. What we finally get is a ν_P denotations in (36).

$$(36) \quad \llbracket [\nu_P [\emptyset\text{-baš }] \lambda_1 [\nu_P \text{ alan } [\nu' \nu_{\text{caus}} [\nu_P \text{ xær- } t_1]]]] \rrbracket = \lambda e \exists e' \exists y [\text{activity}(e) \wedge \text{agent}(\text{alan})(e) \wedge \text{cause}(e')(e) \wedge \text{eat}(e') \wedge \text{theme}(y)(e') \wedge \text{soup}(y)] \stackrel{\text{df}}{=} \text{EAT_SOUP}$$

ν_P , as (29) indicates, is what inflected clauses and nominalizations share. Let us see what happens if the ν_P s in (35) and (36) are combined with the aspectual morphology located, by hypothesis, in Asp. In Sections 2.1–2.3, we have shown that the contribution of the verbal prefix is the perfective grammatical aspect, obligatory telicity and Slavic type aspectual composition.

We suggest that the perfective operator in languages like Ossetian is analyzed as a function that, first, maps events to times such that those times include the running time of the event and, secondly, imposes a quantization condition on the event predicate:

$$(37) \quad \llbracket \text{PFV} \rrbracket = \lambda P \lambda t \exists e [P(e) \wedge \tau(e) \subset t \wedge \text{QUA}(P)] \\ \text{where } \text{QUA}(P) = 1 \text{ iff } \forall x \forall y [P(x) \wedge P(y) \rightarrow \neg x < y]$$

The former aspect of perfectivity is in line with Klein's (1994 *et seq.*) theory of aspect. The latter is independently argued for in (Krifka 1992) for Slavic-type perfectivity. The QUA(ization) condition says that an event predicate is quantized, that is, if any two events fall under its denotation, none of them is a proper part of another.

The crucial fact about ν_P denotations in (35)–(36) is that the former is quantized but the latter is not. To see this, let us first examine properties of event predicates in (38)–(39), which only contain change of state subevents from (35)–(36) in their extensions:

$$(38) \quad \lambda e [\text{eat}(e) \wedge \text{theme}(\sigma x.\text{soup}(x))(e)]$$

$$(39) \quad \lambda e \exists x [\text{eat}(e) \wedge \text{theme}(x)(e) \wedge \text{soup}(x)]$$

It is not difficult to show that if e is an event in which the maximal individual consisting of all the soup available in the universe of discourse has been eaten, no proper part of e is an event in which the same individual has been eaten. Hence the predicate in (38) is quantized. In contrast, if e is an event in which some individual that falls under 'soup' has been eaten, then any part of e is an event in which some (smaller) individual has been eaten. The predicate in (39) thus fails to be quantized.

Now consider event predicates of the form $\lambda e \exists f [\text{activity}(e) \wedge \text{agent}(x)(e) \wedge \text{cause}(f)(e) \wedge Q(f)]$. Since this is exactly the format of (35)–(36), where Q stands for (38)–(39), we have to show that such predicates are quantized (for a fixed individual x and event predicate Q) iff Q is. In general, this is a complicated task, given the modal semantics of the causal relation (see Kratzer 2005 for a recent discussion). Fortunately, for our purposes we only need to consider a special case. Incremental verbs like 'eat' denote complex eventualities where activity and change of state subevents are temporally co-extensive and where there is a one-to-one mapping between parts of the change of state and parts of the activity. For verbs like 'eat' it is necessary that for any part e' of the process e of getting eaten there be a corresponding piece f' of activity f that brings e' about, and that the running time of e' and f' be identical. Therefore, we can think of the lexical

meaning of ‘eat’ (and other incremental verbs, of course) as imposing additional constraints on the causal relation. Specifically, the relation between activity and process subevents has a property of mapping to subordinate subevents with temporal coincidence:

- (40) The relation R on events is a mapping to subordinate subevents with temporal coincidence, MSbE, iff

$$\forall e \forall e' \forall e'' [R(e')(e) \wedge e'' < e \rightarrow \exists e''' [e''' < e' \wedge R(e''')(e'') \wedge \tau(e''') = \tau(e'')]]$$

Another property we need is the uniqueness of subordinate subevents in (41):

- (41) The relation R on events satisfies the uniqueness of subordinate subevents, USbE, iff

$$\forall e \forall e' \forall e'' [R(e')(e) \wedge R(e'')(e) \rightarrow e' = e'']$$

Again, the property in (41) need not hold for the causal relation in general, but it does hold for the relation between activity and change of state subevents denoted by predicates like ‘eat’.⁸

If (40) and (41) are correct, and the causal relation between activity and process subevents for verbs like ‘eat’ satisfies both MSbSE and MSoSE, we get a special type of causation whereby two eventualities are causally related down to their proper parts and temporally coincident.

With this refinement, let us look at the predicate $P = \lambda e \exists f [\text{activity}(e) \wedge \text{agent}(x)(e) \wedge \text{cause}(f)(e) \wedge Q(f)]$ again. Let Q be quantized. We can show that P is quantized, too, using exactly the same reasoning as Krifka (1992: 41, 1998: 214) applies to his incremental predicates with the quantized incremental theme. Assume, to the contrary, that P is not quantized. This means that there are e and e' , such that $e' < e$ and $\exists f [\dots \text{cause}(f)(e) \wedge Q(f) \dots]$ and $\exists f' [\dots \text{cause}(f')(e') \wedge Q(f') \dots]$. Let f be an event caused by e such that $Q(f)$, and f' be an event caused by e' such that $Q(f')$. Given MSbE, it follows that there is an event f'' such that $f'' < f$ and $\text{cause}(f'')(e')$ and $Q(f'')$. But due to the USbE, $f'' = f'$, hence $f' < f$, which contradicts the initial assumption that Q is quantized. Hence P is quantized. The reader can easily convince himself that if Q is not quantized, neither is P , provided that (40) and (41) hold. Therefore, EAT_THE_SOUP in (35) is quantized, whereas EAT_SOUP in (36) is not.

Combining PFV in (37) with the predicates in (35)–(36) yields properties of times in (42a-b):

- (42) a. $\| [\text{AspP PFV ba-} [\text{vP alan} [\text{v}' \text{v}_{\text{caus}} [\text{VP xær- } \sigma\text{-baš}]]]] \| = \lambda t \exists e [\text{EAT_THE_SOUP}(e) \wedge \tau(e) \subset t \wedge \text{QUA}(\text{EAT_THE_SOUP})]$
 b. $\| [\text{AspP PFV ba-} [\text{vP alan} [\text{v}' \text{v}_{\text{caus}} [\text{VP xær- } \emptyset\text{-baš}]]]] \| = \lambda t \exists e [\text{EAT_SOUP}(e) \wedge \tau(e) \subset t \wedge \text{QUA}(\text{EAT_SOUP})]$

Crucially, the predicate of times in (42b) denotes an empty set of times since the event predicate EAT_SOUP, which, as we have just seen, is not quantized, does not meet the QUA condition. In this way PFV “filters out” non-quantized predicates based on cumulative arguments like ‘soup’; only event predicates involving definite DPs like EAT_THE_SOUP in (35) can pass through PFV. This means that non-quantized predicates like (36) can never show up in any

⁸ A fully elaborated theory of incremental predicates may involve a number of further constraints on the relation between the activity and change of state. Natural candidates are properties of mapping to superordinate subevents and uniqueness of superordinate subevents, mirror images of (40) and (41). This type of theory can be thought of as an extension and generalization of Krifka’s (1989, 1992, 1998) notion of incrementality originally defined for thematic relations between individuals and events. At least one advantage of such an extension is that it opens a way of treating on a par distinct classes of incremental predicates — incremental theme predicates, incremental path predicates and degree achievements.

syntactic configuration involving Asp that hosts the perfective operator. It is in this way that obligatory telicity and Slavic-type aspectual composition emerge in languages like Ossetian.

As we have seen earlier, Asp effects is what nominalizations and fully inflected clauses based on prefixed verb stems have in common. In our system these effects are derived by the assumption that the prefix is a realization of the perfective Asp (hence whenever we see a prefix the perfective Asp is there) combined with the semantics for PFV in (37) independently motivated for Slavic-type aspectual systems. However, nominalizations allow for another option: ν P merges with the nominalizing morphology directly, before Asp is projected and the prefix is merged (see (27a)). At this stage of derivation the ν P denotes aspectless predicates of events in (35)–(36), whereby no temporal properties of those events have been introduced and no conditions on the structure of a denotation of the whole predicate have been imposed. Denotations of prefixless nominalizations are shown in (43a) and (43b); they are identical to ν P denotations in (35) and (36).

- (43) a. \parallel $[_{NP} [_{\nu P} \text{alan} [_{v'} \nu_{caus} [_{\nu P} \text{x}\text{\ae}r\text{-}\sigma\text{-ba}\check{s}}]]] \text{NMN}] \parallel = \lambda e \exists e' [\text{activity}(e) \wedge \text{agent}(\text{alan})(e) \wedge \text{cause}(e')(e) \wedge \text{eat}(e') \wedge \text{theme}((\sigma x.\text{soup}(x))(e'))]$
 b. \parallel $[_{NP} [_{\nu P} [\emptyset\text{-ba}\check{s}}] \lambda_1 [_{\nu P} \text{alan} [_{v'} \nu_{caus} [_{\nu P} \text{x}\text{\ae}r\text{-}t_1]]]] \text{NMN}] \parallel = \lambda e \exists e' \exists y [\text{activity}(e) \wedge \text{agent}(\text{alan})(e) \wedge \text{cause}(e')(e) \wedge \text{eat}(e') \wedge \text{theme}(y)(e') \wedge \text{soup}(y)]$

Let us see what the analyses in (43a-b) say about properties of prefixless nominalizations discussed in Sections 2.1–2.4, namely, about their viewpoint aspect (see (5a-b)), telicity (see (11a-b)) and aspectual composition (see (12.1–2)).

The prediction of (43) for aspectual composition is straightforward: the predicate in (43a) is the same as in (35), which is quantized, and the predicate in (43b) is the same as in (36), which is not. As the non-quantized event predicate in (43b) is not filtered out by the perfective operator, no effects characteristic of Slavic type aspectual composition should be detected; the internal incremental argument need not be interpreted as quantized. In fact, as we saw in (12), the prefixless nominalization allows for two readings — (12.1) in which the direct object refers to a maximal quantity of soup, and (12.2) where the same DP possesses an indefinite interpretation. As the reader can easily check, this is precisely what can be expected if the derived nominal can have both predicates in (43a-b) as part of its meaning.

Related to the aspectual composition is telicity: since the verb ‘eat’ denotes an incremental relation between events and their theme participants, telicity of (12.1–2) goes hand in hand with the interpretation of the incremental theme. When the theme is based on a quantized nominal predicate, a complex verbal predicate is telic; otherwise, it is atelic. Again, (43a-b) accounts straightforwardly for this range of interpretations: (12.1) is telic because (43a) is quantized, and (12.2) is atelic, because (43b) fails to be quantized.

To account for examples like (11a-b), repeated as (44a-b), a bit more effort is required, since we have not yet said anything about where their atelic interpretation comes from.⁹

- (44) a. $\check{c}i\check{z}\check{z}\text{-}i$ iw $\check{s}axat\text{-}m\check{a}e$ qug $dix\text{-}d\text{-}i$ $f\check{a}e\check{s}t\check{a}e\dots$
 girl-GEN one hour-ALL cow milk-PRT-GEN after
 ‘After the girl milked the cow in an hour...’
 b. $\check{c}i\check{z}\check{z}\text{-}i$ iw $\check{s}axat\text{-}i$ qug $dix\text{-}d\text{-}i$ $f\check{a}e\check{s}t\check{a}e\dots$
 girl one hour-GEN cow milk-PRT-GEN after
 ‘After the girl spent an hour milking the cow...’

One possibility open at this juncture that is to say that our conclusion from Section 2.2 is at least partially incorrect: prefixless nominalizations like (44b) are imperfective after all. It is

⁹ We are grateful to Chris Piñon for urging us to lay out this part of the argument in more detail.

their imperfectivity that shows up in examples where, as in (44b), the event does not culminate. Same or similar claim is not infrequently made about acc-ing nominalizations in English like *John's reading a book* (e.g., Alexiadou 2005, Alexiadou et al. 2010). We have serious reasons to doubt that this can be a true story about (44b), however (although not necessarily about acc-ing nominalizations in English). Our argument is as follows: once a prefixless nominalization is imperfective, it is predicted that any verb stem has to show the same or similar reading as (44b). The imperfective is lexically unselective, hence if it is a part of the semantic representation of (44b), we have to find it in any prefixless nominalization no matter what its lexical content is. Moreover, a nominalization is expected to describe precisely the same type of eventuality as a corresponding imperfective fully inflected clause, as at least up to the level of AspP these two must be literally the same. This prediction is wrong, however. Consider (45):

- (45) a. alan-1 fonz minut-mæ qažin šaš-t-1 fæštæ...
 A.-GEN five minute-ALL toy break-PRT-GEN after
 'After Alan broke the toy in five minutes...'
- b. *alan-1 fonz minut-1 qažin šaš-t-1 fæštæ...
 A.-GEN five minute-GEN toy break-PRT-GEN after
 'After Alan spent five minutes breaking the toy ...'

Unlike in (44b), the nominalization in (45b) does not allow for an atelic interpretation. Compare (45b) with an imperfective fully inflected clause:

- (46) alan qažin šaš-ta.
 A. toy break-TR.3SG
 'Alan was breaking the toy (when I saw him).'

If (45b) is imperfective like the fully inflected clause in (46), and it is imperfectivity that makes (44b) pass the test for atelicity, we would expect that (45b) allows for an atelic reading, too. This is not the case, however. We conclude, therefore, that the source of atelicity in (44b) has to be kept distinct from imperfectivity.

Note as well that atelicity in (44b) is unlikely to have to do with the properties of the direct object. The verb 'milk', unlike 'eat', does not involve an incremental relation between individuals and events in the first place: it is not the case that the more one milks a cow, the bigger part of the cow is milked. And if the relation is not incremental, there is no way for characteristics of the argument to determine telicity of the verbal predicate.

Our suggestion is that what happens in (44b) has to do with the phenomenon referred to in the literature as non-culmination (Koenig, Muansuwan 2001, Bar-el et al. 2005, Tatevosov, Ivanov 2009). In a variety of languages, perfective fully inflected clauses based on accomplishment predicates exhibit the behavior similar to what we observe in Ossetian nominalizations. They do not entail that the described event culminates in our world and license a reading where the sentence refers to the agent's activity that aims at bringing about a change of state but stops before that change is attained. Crucially, on such a reading perfective accomplishments co-occur with measure adverbials like 'for two hours', not with time-span adverbials like 'in two hours'. (47) is an example from Karachay-Balkar, a Turkic language spoken by Karachay and Balkar people, neighbors of Ossetians.

- (47) Karachay-Balkar (Altaic, Turkic)
- a. alim eki saʒat-xa baxca-ni sür-dü.
 A. two hour-DAT field-ACC plow-PST.3SG
 'Alim plowed a field in two hours.'
- b. alim eki saʒat baxca-ni sür-dü.

A. two hour field-ACC plow-PST.3SG
 ‘Alim was involved in plowing the field for two hours.’ (Tatevosov, Ivanov 2009)

We propose that Ossetian is essentially like Karachay-Balkar in that accomplishments do not necessarily describe culminating events. However, since the perfective operator in Ossetian, unlike in Balkar, contains QUA (see (37)), it always blocks the non-culminating reading in any prefixed configuration. We only have a chance to observe it in prefixless nominalizations under the perfective construal.

One immediate advantage is that on the non-culminating analysis, the fact that atelic nominalizations are available for some verbs (e.g., ‘milk’ in (44)), but not for others (e.g., ‘break’ in (45)) is no longer surprising. There is independent evidence suggesting that non-culminating readings are heavily lexically restricted. While these restrictions can vary across languages (see Tatevosov, Ivanov 2009), it is seldom the case that non-culminating readings are available for all accomplishments in a language. For instance, in Karachay-Balkar this is not an option for ‘kill’ in (48):

(48) *Alim bir saġat Kerim-ni öldür-dü.
 A. one hour K.-ACC kill-PST.3SG
 lit. ‘Alim killed Kerim for an hour.’

In the literature, a number of analyses of non-culmination have been proposed. Space limitations prevent us from going into detail here. We believe that nothing in what we want to say about Ossetian examples like (44a-b) depends crucially on the choice of a particular theory of non-culmination. To be specific, let us assume with Tatevosov, Ivanov (2009), that non-culminating predicates are derived from culminating ones by a continuation modality (CM) operator, which is identical to Landman’s (1992) PROG operator mapping events to their stages, except for one thing. Since a stage of an event e can be e itself, PROG allows the event to culminate in the base world. CM, in contrast, maps events to their *proper non-final stages*.¹⁰ The CM operator may be overt in some languages and covert in others. Ossetian is a language of the latter type. Therefore, while (44a) involves an event predicate in (49a) as a νP denotation, νP in (49b) denotes stages of events from (44b):

(49) a. $\| [\nu P \text{ čizž} [\nu P \text{ qug dix-}]] \|^{w,g} = \lambda e[\exists e' [\text{activity}(e) \wedge \text{agent}(\text{alan})(e) \wedge \text{cause}(e')(e) \wedge \text{milk}(e') \wedge \text{theme}(\text{cow})(e')]]]$
 b. $\| [\text{CM} [\nu P \text{ čizž} [\nu P \text{ qug dix-}]] \|^{w,g} = \lambda e.\text{CM}(\lambda e'[\exists e'' [\text{activity}(e') \wedge \text{agent}(\text{alan})(e') \wedge \text{cause}(e'')(e') \wedge \text{milk}(e'') \wedge \text{theme}(\text{cow})(e'')]])(e)$

(49a-b) give us two readings of the prefixless nominalization ‘milk the cow’ in (44). Given the semantics of the perfective operator in (37), it is not difficult to see what happens if instead of deriving a nominalization we go on building a clause. At the next stage of derivation νP s in (49) merge with the perfective aspectual operator. The crucial fact about (49b) is that it fails to be quantized. The formal proof of this claim requires a lot of technicalities and goes beyond our immediate scope. The overall idea, however, is clear: if e is a proper non-final stage of e' (with e' falling under a certain event description P), and e'' is a proper part of e , then e'' can also be a proper non-final stage of e' (although we can imagine, given Landman’s (1992)

¹⁰ To avoid terminological confusion, we have to emphasize that the operator creating non-culminating accomplishments does not introduce the imperfective viewpoint aspect. As Tatevosov, Ivanov (2009) show, the output of the application of this operator can serve as input to both perfective and imperfective aspectual operators. Koenig and Muansuwan (2001) and Bar-el et al. (2005) independently make a similar point. In this way, non-culmination and perfectivity/imperfectivity are to be kept distinct, they argue; the notion of viewpoint aspect should be reserved to refer to relations between a running time of an event and a reference time.

understanding of stages, that some proper parts of a stage of an event are themselves not its stages.). This means that predicates like (49b) are not quantized. Accordingly, they cannot survive after the *vP* combines with a prefix: given a quantization condition the prefix in (37) imposes on its complement, we will get an empty set of times — in precisely the same way as in (42b), where the prefix combines with an incremental predicate based on a cumulative DP.

Therefore, any atelic predicate, being non-quantized, is filtered out in perfective fully inflected clauses and in prefixed nominalizations. (In this respect Ossetian differs from languages like Karachay-Balkar, which do not possess the Ossetian-type perfectivity, so non-culmination effects are observed in fully inflected clauses as well, as we see from (47a-b).) However, a prefixless nominalization lacking the perfective Asp is exactly the right type of configuration where a non-culminating predicate like ‘milk the cow’ in (49b) can show up.

Finally, let us go back to examples like (4a) and (5a) from Section 2.2, where prefixless nominalizations reveal their aspectless nature when combined with temporal postpositions. We have seen that these nominalizations are compatible with both perfective and imperfective aspectual construals. This seems to follow straightforwardly from the semantics in (43a-b). Representations like (43a-b) capture successfully the crucial fact: prefixless nominalizations denote predicates of events, not predicates of times, hence do not specify any constraints on the relation between the running time of the event and the reference time, that is, do not render any aspectual information. This predicts, correctly, that prefixless nominalizations should be acceptable as complements of temporal postpositions irrespective of aspectual needs of the latter.¹¹

This is our story accounting for why prefixed nominalizations do, and prefixless nominalizations do not share aspectual properties with fully inflected clauses. Now we are ready to discuss transitivity alternations in nominalizations introduced in Section 2.4.

3.4. Deriving transitivity alternations

The puzzle we have to address is: fully inflected clauses and nominalizations differ systematically as to the availability of the causative-inchoative alternation. We have seen, in particular, that there is a class of prefixed verbs like *štavm* ‘warm up’ that show the causative-inchoative alternation in nominalizations but not in fully inflected clauses. Relevant examples are repeated as (50)–(51).

- (50) a. Alan š-tæv-d-ta baš.
 A. PRF-heat-PST-TR.3SG soup
 ‘Alan heated the soup.’
 b. *baš š-tæv-d-ta / š-tæv-d-i.
 soup PRF-heat-PST-TR.3SG PRF-heat-PST-INTR.3SG
 ‘The soup heated.’
- (51) a. Alan-₁ baš š-tæv-d-₁ fæštæ...
 A.-GEN soup PRF-heat-PRT-GEN after
 ‘After Alan heated the soup...’
 b. baš-₁ š-tæv-d-₁ fæštæ...
 soup-GEN PRF-heat-PRT-GEN after

¹¹ We leave for a future occasion a complete analysis of the interaction between temporal postpositions and their nominalized complements. One point, however, is worth mentioning here. Such postpositions require times as their arguments, but prefixless nominalizations are event-denoting. It is naturally to suggest that type coercion is called for in that case, creating a temporal expression out of an event-denoting one. Type coercion is independently attested in examples like *begin reading a book* vs. *begin a book*, where the object-denoting DP is coerced into an event denoting DP to satisfy requirements of the phasal verb. Note that event-time coercion requires by far less interpretative effort than object-event coercion.

‘After the soup heated...’

We have suggested in Section 3.1 that the difference observable in (50)–(51) has to do with the finite T that nominalizations lack. In the course of derivation of a clause the inchoative configuration is blocked, but in nominalization it can survive. Clearly, this pattern is very similar to the one we have discussed in connection with the Asp effects. The range of possibilities available at the vP level narrows down at the Asp level, when the prefix is merged. We may want to apply the same logic of analysis to argument alternations: verbs like *tavin* ‘warm up’ allow both transitive and inchoative configurations at the VP level, but later on the latter is filtered out by T — in the same fashion as non-quantized vPs are filtered out by the prefix. In other words, the intransitive (inchoative) variant in (50b) is ungrammatical because of a clash between a certain needs of T and inability of its complement AspP to provide it with what it needs. If T does not appear in the derivation, as in (51), the clash does not occur. On this view, therefore, it is not vP where transitivity of the clause is finally determined, at least in languages like Ossetian, but a functional structure dominating it.

Possibly, here we are dealing with a parameter of cross-linguistic variation. In some languages, English among them, computation of transitivity is done at the vP level. In such languages, vP -based nominalizations (e.g., English acc-ing nominalizations) can never show more freedom in argument realization than fully inflected clauses. In languages like Ossetian, however, the ultimate decision if a clause comes out transitive is “delayed” until T (or some other functional head above vP , see the discussion in Section 3.2) is merged.¹² In such languages, nominalizations are created before this decision has been made. (See Pazelskaya 2006 on nominalizations in Russian, which exhibit an alternation pattern that resembles Ossetian in many respects.) If this idea is on the right track (and as we have tried to show there are good empirical reasons to believe it indeed is), one can imagine a number of ways in which it can be implemented.

Here is one possible way to go. The common intuition one can find in the literature on argument structure and argument alternations is that properties of a lexical element constrain the type of configuration it projects or is inserted into. Harley and Noyer (2000), for instance, develop a theory of licensing of vocabulary items (VIs) in which every VI is assigned information about its licensing environment. An essential part of this information is the $[\pm\text{cause}]$ feature that determines what ‘flavor’ of v LI appears with (transitive, inchoative, or both). If LI is $[\text{+cause}]$ it cannot be inserted into a structure containing v_{BECOME} . Causative-inchoative alternation, then, obtains if LI is underspecified for the value of the cause feature, hence is compatible with both v_{CAUSE} and v_{BECOME} .

Much in the same spirit, Alexiadou et al. 2006 propose that the membership of a verbal root in one of the four basic classes — agentive, externally caused, internally caused and cause underspecified — determines whether this root must, can or cannot appear in the environment of the Voice head and what properties Voice can have. If the root is cause underspecified, the causative-inchoative alternation results.

If one follows this line of reasoning, one can suggest that licensing of vocabulary items in languages like Ossetian is not as local as in English. vP is not a licensing authority; a higher functional head (presumably T) is. In that case, we may want to have different flavors of T, not flavors of v . In a system where the locus of transitivity is Voice, we can hypothesize that the position of Voice in the functional sequence is higher in languages like Ossetian than in languages like English.

The reason why we do not pursue this line of analysis is its unattractive side-effect on the interpretation of the whole configuration. To the extent that the higher Voice hypothesis actually

¹² In line with this hypothesis is the fact that Ossetian distinguishes between so called transitive and intransitive conjugations, whereby the phonological shape of past tense affixes depends on transitivity of the verb. If tense morphology is a realization of T, we have a piece of independent morphological evidence supporting the view that T takes care about transitivity of its complement.

involves external arguments introduced higher than at the ν P level, we get into trouble trying to relate them to events via thematic roles. We are dealing with the event structure up to the ν P level. At later stages of derivation, temporal structure is introduced in Asp, and the event argument gets bound (see, e.g., (37)). As soon as this happens, the event argument is no longer accessible for semantic operations, hence there is no easy way of connecting it to the agent / causer participant, at least if we do not want to resort to ad hoc manipulations like existential disclosure.

For this reason we assume a slightly different strategy of dealing with the problem in question. We suggest that external arguments are introduced at the ν P level, as is standardly assumed, but the evaluation of whether the ν P can fit into a larger clausal structure is delayed until T is merged. We hypothesize, therefore, that at the ν P level a transitive lexical item can appear in the anticausative configuration, but later T prevents such a configuration from projecting into a clause. In nominalizations, where T is absent, it can survive, however. Below comes a specific implementation of this idea, whereby the mismatch between the requirements of T and properties of its complement is reduced to the logical type mismatch. On this view, the mismatch induces a crash of the derivation at the syntax-semantics interface.

Here is a first attempt. Following many proposals mentioned above (see also Harley 2005, Folli, Harley 2004, 2006, 2007), let us assume that in Ossetian, like in other languages, ν comes in different ‘flavors’. We have already seen one of them – the transitive ν_{caus} in (33) repeated here in (42a).

$$(52) \quad \|\nu_{caus}\| = \lambda S_{\langle e, \langle \nu, \langle \nu, t \rangle \rangle \rangle} \lambda x \lambda e \exists e' [S(x)(e')(e)]$$

Crucial for our purposes is the analysis of its inchoative counterpart $\nu_{anticaus}$. Let us consider first the semantics of $\nu_{anticaus}$ represented in (53).

$$(53) \quad \|\nu_{anticaus}\| = \lambda R_{\langle \nu, \langle \nu, t \rangle \rangle} \lambda e \exists e' [R(e)(e')]$$

The two flavors of ν in (52) and (53) differ as to what subevent variable is externalized: in (52), the λ -bound event variable ranges over causing subevents, whereas in (53), $\nu_{anticaus}$ creates a property of caused subevents. This reflects an intuition that events referred to by causatives and anticausatives are distinct. (See Abush (2005) for the argument from adverbial modification and Lyutikova, Tatevosov (2010) for the evidence from non-culminating readings.) Another difference is that (52) takes a relation between individuals and two (sub)events and passes the individual argument on; (53), in contrast, combines with a VP complement where no individual argument positions is open.

This semantics, however, does not give us what we need. Let us see why. For a verb to combine with both ν_{caus} and $\nu_{anticaus}$ it has to be cause underspecified. Let us assume, therefore, that roots like *tav-* ‘heat, warm up’ indeed are. After causative and inchoative ν Ps are created and the root gets inserted into them, we get well-formed and interpretable configurations. Merging them with Asp would give us predicates of times in (54)–(55), which represent the meaning of AspPs shared by inflected clauses in (50) and nominalizations in (51). (Since issues of aspectual composition are irrelevant for the causative-inchoative alternation, in this section we analyze DP arguments as individual constants.)

$$(54) \quad \|\llbracket_{\text{AspP}} \text{PFV} \llbracket_{\nu\text{P}} \text{alan } \nu_{caus} \llbracket_{\nu\text{P}} \text{tav- baš} \llbracket \rrbracket \rrbracket \rrbracket = \lambda t \exists e' \exists e [\text{process}(e) \wedge \text{causer}(\text{alan})(e) \wedge \text{cause}(e')(e) \wedge \text{heat}(e') \wedge \text{theme}(\text{soup})(e') \wedge \tau(e) \subset t \wedge \text{QUA}(\dots)]$$

$$(55) \quad \|\llbracket_{\text{AspP}} \text{PFV} \llbracket_{\nu\text{P}} \nu_{anticaus} \llbracket_{\nu\text{P}} \text{tav- baš} \llbracket \rrbracket \rrbracket \rrbracket = \lambda t \exists e' \exists e [\text{process}(e') \wedge \text{cause}(e)(e') \wedge \text{heat}(e) \wedge \text{theme}(\text{soup})(e) \wedge \tau(e) \subset t \wedge \text{QUA}(\dots)]$$

Embedding (54)–(55) under the nominal head would give us nominalizations in (51a-b) that exhibit the causative-inchoative alternation. This is a desired result. However, at this point it becomes clear that the ungrammaticality of the inchoative clause in (50b) is not easily explained. If we continue building a clause, merging AspPs in (54)–(55) with the finite T, there is no obvious way of preventing its derivation. There is nothing wrong either semantically or syntactically with the structure in (55), and there is no reason why the derivation should crash after (55) merges with T. We definitely do not want T to block any configuration like (55), since this would predict that Ossetian does not have unaccusative/anticausative clauses at all, which is obviously wrong, as (56a) with its semantic analysis in (56b) indicate.

- (56) a. art a-xwiššid-i.
fire PRF-go.out-INTR.3SG
'The fire went out.'
- b. $\| [_{\text{AspP}} \text{PFV} [_{\text{vP}} v_{\text{anticaus}} [_{\text{VP}} \text{art xwiššid}]]] \| = \lambda t \exists e' \exists e [\text{process}(e') \wedge \text{cause}(e)(e') \wedge \text{go.out}(e) \wedge \text{theme}(\text{fire})(e) \wedge \tau(e) \subset t \wedge \text{QUA}(\dots)]$

But after the derivation of AspP is complete, (56b) is in all relevant respects identical to (55). It is by far not clear how to exclude the derivation of (55) without obtaining the same result for (56b).

Now comes the first crucial move. We propose that verbs like *tavin* 'heat, warm up' are basically transitive in a sense that in the Encyclopedia, they are endowed with an accomplishment event structure in (57).

- (57) $\| [_{\text{V}} \text{tav-}] \| = \lambda y \lambda x \lambda e \lambda e' [\text{process}(e) \wedge \text{causer}(x)(e) \wedge \text{cause}(e')(e) \wedge \text{heat}(e') \wedge \text{theme}(y)(e')]$

Saturating the internal argument position yields the VP denotation in (58).

- (58) $\| [_{\text{VP}} \text{tav- baš}] \| = \lambda x \lambda e \lambda e' [\text{process}(e) \wedge \text{causer}(x)(e) \wedge \text{cause}(e')(e) \wedge \text{heat}(e') \wedge \text{theme}(\text{soup})(e')]$

The second crucial move relies on the idea that semantic requirements of the transitive verbs are satisfied with a certain delay — not at the vP level. At early stages of derivation, the anticausative configuration can tolerate semantically transitive verb. It simply passes its external argument on:

- (59) $\| v_{\text{anticaus}} \| = \lambda S_{\langle e, \langle v, \langle v, t \rangle \rangle} \lambda x \lambda e \exists e' [S(x)(e)(e')]$

However, the anticausative *v* never projects a specifier, hence the external argument position in (59) has little chance to be discharged by the argument XP.¹³ In such a system, *v* only takes care of the external argument syntactically, by not projecting Spec-vP, but not semantically. The result of the application of the *v* denotation in (59) to the denotation of the VP in (58) is (60), which is a relation between individuals and (caused) events in which the theme warms up. Combining VP in (58) with the transitive flavor of *v* in (52) yields (61), a relation between individuals and events that bring about the theme's heating.

¹³ Chirs Piñon (p.c.) rises a question why the external argument position of (58) cannot be discharged by realizing an appropriate XP as an adjunct. We believe that the right answer to this question, whatever it is, is external to the story we are telling here. It is not generally the case that arguments can be realized freely as adjuncts. Whatever the correct explanation for ungrammaticality of sentences like *There killed John by Sue* 'Sue killed John' is (here the external argument appears as a by-phrase), the same or similar reasoning applies to the case we are discussing here.

$$(60) \quad |[v' \nu_{anticaus} [_{VP} \text{tav- baš}]]| = \lambda x \lambda e \exists e' [\text{process}(e') \wedge \text{causer}(x)(e') \text{ cause}(e)(e') \wedge \text{heat}(e) \wedge \text{theme}(\text{soup})(e)]$$

$$(61) \quad |[v' \nu_{caus} [_{VP} \text{tav- baš}]]| = \lambda x \lambda e \exists e' [\text{process}(e) \wedge \text{causer}(x)(e) \text{ cause}(e')(e) \wedge \text{heat}(e') \wedge \text{theme}(\text{soup})(e')]$$

The rest of the derivation of the transitive νP denotation is straightforward. The transitive νP does project a specifier, where the subject argument is merged. Combining the relation between individuals and events in (61) with the denotation of that argument produces a νP denotation in (62), which is a property of events e such that e is an event that causes the heating of the soup and of which Alan is the causer.

$$(62) \quad |[_{\nu P} \text{alan} [v' \nu_{caus} [_{VP} \text{tav- baš}]]]| = \lambda e \exists e' [\text{process}(e) \wedge \text{causer}(\text{alan})(e) \text{ cause}(e')(e) \wedge \text{heat}(e') \wedge \text{theme}(\text{soup})(e')]$$

Now since the unaccusative νP does not project a specifier, its denotation, we propose, is still a relation between individuals and events, since the individual causer argument is neither saturated nor bound:

$$(63) \quad |[_{\nu P} [v' \nu_{anticaus} [_{VP} \text{tav- baš}]]]| = \lambda x \lambda e \exists e' [\text{process}(e') \wedge \text{causer}(x)(e') \text{ cause}(e)(e') \wedge \text{heat}(e) \wedge \text{theme}(\text{soup})(e)]$$

The causal component in the semantics in (63) seems to be uncontroversial. We know that anticausatives, like transitives, involve external causation (cf. Chierchia 2004, Alexiadou et al. 2006, Koontz-Garboden 2007). The analysis in (43b) captures this by suggesting that change of state events in the extension of the predicate ‘warm up’ are brought about by some process event to which its individual participant stands in the causer thematic relation.

The next stage of derivation is a creation of AspP by merging the prefix. As was established in Section 3.4, it imposes a quantization condition on the relevant set of events and maps events to times. A natural suggestion would be that it does not take care of whatever other aspects of the meaning of its complement. Specifically, it can combine with νP of whatever logical type, be it $\langle v, t \rangle$ like in (62), or $\langle e, \langle v, t \rangle \rangle$ like in (63).

(64a-b) present two versions of the PFV operator: (64a) is identical to (37), while (64b) is a variant that combines with νP with an unsaturated individual argument.

$$(64) \quad \begin{aligned} \text{a. } & \| \text{PFV} \| = \lambda P \lambda t \exists e [P(e) \wedge \tau(e) \subset t \wedge \text{QUA}(P)] \\ \text{b. } & \| \text{PFV} \| = \lambda R \lambda x \lambda t \exists e [R(x)(e) \wedge \tau(e) \subset t \wedge \text{QUA}(\lambda e'. R(x)(e'))] \\ & \text{where } \text{QUA}(P) = 1 \text{ iff } \forall x \forall y [P(x) \wedge P(y) \rightarrow \neg x < y] \end{aligned}$$

(64b) is like (64a) in all relevant respects: the running time of the event is included in the reference time and a predicate of events must be quantized. Perfectivity by itself, at least in languages like Ossetian, does not operate on individual arguments and allows the individual argument of R in (64b) to pass to the next stage of derivation.

Therefore, applying (64b) to (63), we get a relation between individuals and times in (65).

$$(65) \quad |[_{\text{AspP}} \text{PFV} [_{\nu P} \nu_{anticaus} [_{VP} \text{tav- baš}]]]| = \lambda x \lambda t \exists e' \exists e [\text{process}(e') \wedge \text{causer}(x)(e') \wedge \text{cause}(e)(e') \wedge \text{heat}(e) \wedge \text{theme}(\text{soup})(e) \wedge \tau(e) \subset t \wedge \text{QUA}(\lambda e \exists e' [\text{process}(e') \wedge \text{causer}(x)(e') \text{ cause}(e)(e') \wedge \text{heat}(e) \wedge \text{theme}(\text{soup})(e)])]$$

Application of (64a) to (62) creates a predicate of times in (66):

$$(66) \quad \llbracket [_{\text{AspP}} \text{PFV} [_{\text{vP}} \text{alan } v_{\text{caus}} [_{\text{VP}} \text{tav- baš}]]] \rrbracket = \lambda t \exists e' \exists e [\text{process}(e') \wedge \text{causer}(\text{alan})(e') \wedge \text{cause}(e)(e') \wedge \text{heat}(e) \wedge \text{theme}(\text{soup})(e) \wedge \tau(e) \subset t \wedge \text{QUA}(\lambda e \exists e' [\text{process}(e') \wedge \text{causer}(\text{alan})(e') \wedge \text{cause}(e)(e') \wedge \text{heat}(e) \wedge \text{theme}(\text{soup})(e)])]]$$

At this point, according to (29), two options are available: we can either go on projecting a clause or build a nominalization. The first option involves merging AspP with T. This is where the AspP denotation in (65) becomes problematic. We suggest that T crucially needs a property of times as its argument, since its semantic function is to locate the reference time with respect to the deictic center. Ignoring multiple issues of the analysis of tense irrelevant for the present discussion, let us assume a simplistic analysis in (67) where the past tense applies to a predicate of times and yields a proposition.

$$(67) \quad \llbracket T_{[\text{PAST}]} \rrbracket = \lambda P_{\langle i, t \rangle} \exists t [P(t) \wedge t \ll t_0]$$

The crucial fact about AspP in (65) is that it fails to provide T with a required property of times, since its individual argument is still not saturated. At this point, the derivation of the perfective finite inchoative clause based on verbs like *štavin* ‘warm up’ crashes. No type mismatch arises, however, if (67) applies to the AspP denotation in (66): the outcome is a proposition in (68):

$$(68) \quad \llbracket [_{\text{TP}} T_{[\text{PAST}]} [_{\text{AspP}} \text{PFV} [_{\text{vP}} \text{alan } v_{\text{caus}} [_{\text{VP}} \text{tav- baš}]]]] \rrbracket = \exists t \exists e' \exists e [\text{process}(e') \wedge \text{causer}(\text{alan})(e') \wedge \text{cause}(e)(e') \wedge \text{heat}(e) \wedge \text{theme}(\text{soup})(e) \wedge \tau(e) \subset t \wedge \text{QUA}(\lambda e \exists e' [\text{process}(e') \wedge \text{causer}(\text{alan})(e') \wedge \text{cause}(e)(e') \wedge \text{heat}(e) \wedge \text{theme}(\text{soup})(e)]) \wedge t \ll t_0]$$

Therefore, our account for why verbs like *štavin* ‘warm up’ only allow for the causative construal in finite clauses relies on the type mismatch between T and its complement. This mismatch arises because the external argument position, lexically specified, is not saturated since the anticausative *v* does not project a specifier. Nor is a corresponding variable existentially bound at the vP or AspP level.

We can further hypothesize that the difference between languages that do show the causative-inchoative alternation in perfective accomplishment finite clauses, e.g., English and those that do not, e.g., Ossetian, reduces to the fact that the former allow existential binding of the external argument at some level before T is merged, while the latter do not. As a result, at the vP and AspP levels the external argument is still neither saturated, nor bound. As soon as the T head appears, which requires its complement denote a set of times, the derivation crashes.

If this line of reasoning is correct, one can predict that in the absence of finite T the anticausative configuration in (65) can survive, provided that some independent mechanism discharges an open individual argument position. A natural suggestion is: the nominalizing morphology induces an existential closure of all individual variables that stand free at a corresponding stage of derivation.

$$(69) \quad \llbracket [_{\text{NP}} [\exists [_{\text{AspP}} \text{PFV} [_{\text{vP}} v_{\text{anticaus}} [_{\text{VP}} \text{tav- baš}]]]] \text{NMN}] \rrbracket = \lambda t \exists x \exists e' \exists e [\text{process}(e') \wedge \text{causer}(x)(e') \wedge \text{cause}(e)(e') \wedge \text{heat}(e) \wedge \text{theme}(\text{soup})(e) \wedge \tau(e) \subset t \wedge \text{QUA}(\lambda e \exists e' [\text{process}(e') \wedge \text{causer}(x)(e') \wedge \text{cause}(e)(e') \wedge \text{heat}(e) \wedge \text{theme}(\text{soup})(e)])]]$$

NP in (69) denotes a set of times that include the running time of a heating change of state event in which the theme participant is soup. This event is brought about by some causing

event with some causer participant. This is precisely what the nominalization in (15b) means. (The derivation of the NP denotation based on the transitive AspP in (66) is straightforward.)

The final question, then, is what are the reasons to believe that nominalization leads to the existential closure. Space limitations prevent us from discussing this issue in detail, but one piece of empirical evidence supporting this generalization is as follows. If existential closure does indeed go along with nominalization, it should not be sensitive to whether the variable it binds appears in the external, as in (69), or in the internal argument position. In other words, if (69) is correct, we expect that nominalizations in Ossetian tolerate unsaturated *internal* arguments. This expectation seems to be borne out. The evidence comes from examples like those in (70).

- (70) a. čīžg ra-dix-d-ta qug.
 girl PRF-milk-PST-TR.3SG cow
 ‘The girl milked the cow.’
- b. *čīžg ra-dix-d-ta.
 girl PRF-milk-PST-TR.3SG cow
 ‘The girl milked.’
- c. čīžž-1 ra-dix-d-1 fæštæ...
 girl-GEN PRF-milk-PRT-GEN after
 ‘After the girl did milking...’

(70a-b) show that syntactic realization of the internal argument in perfective finite clauses is obligatory. This, however, does not hold for nominalizations: unlike its finite counterpart, the nominalization in (70c) can go without the internal argument. If the nominalization induces an existential closure of all individual variables, this is exactly what we predict ([\exists_x [... milk(e) \wedge theme(x)(e) ...]]). Given evidence from (70), (69) is no more surprising: irrespective of what argument position is open when the nominalization is built, the same mechanism seems to be at work in both cases.

To recapitulate, our account for why verbs like *tavin* ‘melt’ are obligatorily transitive in the finite environment, but show the causative-inchoative alternations in the nominal environment, relies on two assumptions. First, a lexical item, for which Encyclopedia provides a transitive semantics, can come along with both v_{caus} and $v_{anticaus}$. In the latter case, being syntactically unaccusative, the vP still involves the external argument. Secondly, this has different consequences depending of the presence of T. At the point of derivation where T appears, having an external argument not discharged leads to a type clash, and the derivation does not converge. If, instead of T, the nominal head merges, the structure is saved by the existential closure.

We agree with Chris Piñon (p.c.) that this system involves a significant syntax-semantics mismatch at the vP level, which is costly. Recall, however, that the scenario we outlined in this section is merely a specific way of thinking about real empirical generalizations we encounter in languages like Ossetian. The whole logic of relationship between fully inflected clauses and nominalizations discussed in Sections 3.1–3.2 suggests that such languages tend to generate the widest possible range of semantic options at early stages of syntactic derivation, consistently narrowing it down as the functional structure is merged. It can be nothing wrong with a certain property α at the F_1P level, but at some point F_i , $i > 1$, α becomes problematic. Being a non-quantized predicate is offensive with respect to Asp hosting the perfective operator, not with respect to v . In much the same way, being a transitive predicate with an unsaturated external argument is offensive with respect to T, but not with respect to v and Asp. We developed one specific version of the story about what exactly is offensive in this particular case, leaving it open for future research if it is possible to come up with plausible alternatives while preserving the overall line of argumentation. We would like to emphasize in conclusion that despite the syntax-semantics mismatch we had to assume, benefits outweigh: what we finally achieve seems

to look as a systematic picture shedding new light on the interaction between fully inflected clauses, nominalizations, and, most significantly, on reasonable strategies of approaching the problem of indirect access.

4. Summary and conclusions

At the very beginning, we took up a problem of indirect access: properties of verbs and verb phrases could be different from what they appear to be when we look at them within fully projected clauses. As a strategy for (partially) solving the problem we came up with a hypothesis that nominalizations provide a more direct access to the verb, since they only contain a part of the functional structure present in a clause. Then we tested predictions derivable from this hypothesis against data from nominalizations in Ossetian.

Our findings seem to lend support to the view adopted throughout this study. It turns out that Ossetian nominalizations exhibit consistently a wider range of syntactic and semantic options than fully inflected clauses. The finite verb in Ossetian is either perfective or imperfective, but the (prefixless) nominalization can be aspectless. Moreover, unlike the finite verb the nominalization need not be telic, and the aspectual composition is organized in the same way as in languages like English, not as in languages like Slavic. Finally, the nominalization allows for transitivity alternations even if a corresponding finite verb does not.

All these facts are naturally explained on the suggestion that the true characteristics of verbs and verb phrases are those we see in nominalizations, not in finite clauses. On this view, for instance, Ossetian is a language where the aspectual composition is organized exactly as in English at the VP level. Also, at the VP level, Ossetian is language where transitivity alternations are constrained in a similar (or even the same) way as in English. Differences are brought about by pieces of functional structure, Asp and T, whose semantic requirements narrow down the range of options available at the VP level.

The welcome consequence of this analysis is that the cross-linguistic variation at early stages of syntactic derivation is minimal. The verb and verb phrase in Ossetian are basically the same as in languages like English. Differences emerge at later stages, when the functional structure appears in the derivation. These differences are thus derivable from language-specific vocabularies of functional heads, and from semantic requirements they impose on their complements. The fact that functional vocabularies are subject to variation is by no means surprising and has to be admitted in the theory anyway. Therefore, the main result of the paper is the recognition of another fact: if our vision is not obstructed by the structure introduced in the course of syntactic derivation, verbs and VPs show much more cross-linguistic similarities than we used to believe.

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