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ONSET AFFRICATE-STOP CLUSTERS IN CROATIAN*

It is explained why affricate-stop sequences should be included among acceptable Croatian syllable onsets. First, there are a few words with initial affricate-stop cluster (e.g. Cr. *čkomiti* 'be silent, hold one's tongue'), in which the fricative sound often alternates with the corresponding affricate sound (e.g. Cr. *žbun* 'bush' → *džbun*). Second, there is the slang metathesis in which affricate-stop clusters become initial onsets (e.g. Cr. *pička* 'cunt' → *čkapi*). Third, there is syllabification in chanting, at sport stadiums or in rock songs. If affricate sounds are more sonorous than stops, which is not beyond doubt, the onset affricate-stop cluster would be yet another case of violating the Sonority Sequencing Principle, beside the well-known case of the onset fricative-stop clusters (e.g. E. *spoon*, *street*, Cr. *spor* 'slow', *strah* 'fear').

I. The problem dealt with in this paper can be succinctly expressed as syllabification of Croatian words such as these:[1]

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[1] Sounds in syllabified Cr. examples will be written in the traditional Croatian transcription: voiceless and voiced postalveolar fricative — [š] and [ž] (IPA: [ʃ] and [ʒ]), voiceless and voiced alveolo-palatal fricative — [ś] and [ź] (orthographically ⟨š⟩ and ⟨ž⟩, IPA: [ɕ] and [ʑ]), voiceless and voiced dental affricate — [c] and [ʒ] (orthographically ⟨c⟩ and ⟨dz⟩, IPA: [ʦ] and [ʣ]), voiceless and voiced postalveolar affricate — [č] and [ǯ] (orthographically ⟨č⟩ and ⟨dž⟩, IPA: [ʧ] and [ʤ]), voiceless and voiced (alveolo-)palatal affricate — [ć] and [ʒ́] (orthographically ⟨ć⟩ and ⟨đ⟩, IPA: [ʨ] and [ʥ]), (alveolo-)palatal nasal — [ń] (orthographically ⟨nj⟩, IPA: [ɲ]), (alveolo-)palatal liquid — [ĺ] (orthographically ⟨lj⟩, IPA: [ʎ]). When different, the orthographical form will be given in chevrons (⟨ ⟩).

kocka	‘cube’
mačka	‘cat’
praćka	‘catapult, slingshot’
vodstvo	‘leadership’
srdžba	‘anger’

We will put forward several reasons why it is acceptable to assign the affricates in them ([c], [č], [ć], [ǯ]) to the onsets of their second syllable (§§ V.1—3). In doing so, we will keep in mind from the outset the following two things. First, the markedly low frequency of voiced affricates in Croatian (i.e. [ǯ] and [ʒ́], non-phonemic [ʒ] is realized only on word boundaries),[2] as well as clusters of which they would be the first member. Second, Croatian has no initial clusters with (alveolo-)palatal affricates, Croatian words do not begin with ćC or ʒ́C.

If our main argument proves to be valid, Croatian would be among languages with possible onset affricate-stop clusters, such as Polish (e.g. *czkać* ‘hiccup’, *dzban* ‘jug’, see § VI below), Albanian (e.g. *çka* ‘what’, *çpim* ‘stab’, see Mann 1948: s. v.), or Northeast Caucasian languages, for example Lezgian (e.g. *čka* ‘place’, *čkal* ‘crust, rind, peel’, see Haspelmath 1993:484).

Since syllabification with onset affricate-stop clusters violates the universal Sonority Sequencing Principle, we will first recall a well-known and well-studied similar case in the Indo-European languages (§ II), as well as the universal Sonority Sequencing Principle and the Sonority Hierarchy for Croatian (§ III). Towards the end of the paper, we will also touch on a theory which offers a quite special interpretation of our problem (§ VI).

II. The idiosyncratic nature of the dental fricative [s] in Indo-European consonant clusters and syllable structure — a sort of imperviousness to syllabification rules — is not unheard of (see, e.g., Gussmann 2002:107—115; Goad 2011; Josipović Smojver 2017:105—107). Back in Proto-Indo-European **s* (* meaning ‘reconstructed’) was known to occur — first, preceding the onset stop,[3] second, within the branching onset, third, within the branching coda (offset) and as the right part of the branching coda, posi-

[2] According to the available data, [ʒ́], [ǯ], and [f] are by far the least frequent Croatian sounds, see Škarić (1991:§ 920) and Brozović (2007:§ 370, count based on data from I. Škarić /1991/ and T. Maretić /1899/).

[3] When it could also have been the so-called *mobile s*, which could either have occurred or not occurred in many roots (on this matter, see Kapović 2008:178—179).

tioned to the right of a laryngeal or a stop (cf. Matasović 1997b; Kapović 2008:§§ 84—86):

*stē.mi	'I praise'
*streb^{h}-	'turn'
*h$_2$stēr	'star'
*Hyēwgst	'harness' (3.SG.AOR)
*muHs	'mouse'
*pōds	'foot'
*nok^{w}ts	'night'

Therefore, **s* could occur anywhere in the syllable except in the nucleus (cf. also Matasović 1997a:114). Matasović (1997b:175) corroborates the claim that »consonant clusters containing **s* behave with respect to syllabic structure like single consonants« with PIE. reduplication, in which both **s* and the following stop are reduplicated, e.g. **steh$_2$*- 'stand' → **ste-sth$_2$*- (PF) (Matasović 1997a:§ 190).[4] The fact that **s* is not included in the established Sonority Hierarchy also testifies, in its own way, to the idiosyncratic nature of the former (cf. Matasović 1997b:176):

laryngeals (H), stops (O) < m, n < r, l < w, y < vowels

We do not know where **s* would be positioned in the hierarchy. What we do know is that the relation of the sonority of PIE. laryngeals and stops is unclear (Matasović 1997b:177), that the possible onsets in PIE. were OH-, HO-, Hs- (but not sH-), Os-, sO- (Matasović 1997b; Kapović 2008), and that laryngeals were probably fricatives just like **s*, »the only« PIE. fricative (Kapović 2008:§ 52). We also know that universally fricatives are more sonorous than stops, which leads us to the conclusion that the Sonority Sequencing Principle (see here § III) in PIE. could be violated both in the onset and in the coda precisely with respect to the sequencing of fricatives and stops.

In modern Indo-European languages also the fricative [s] and its congeners ('s' here being a cover term for fricative sounds [s], [š], [ś], [z], [ž], [ź], see Goad 2011) can occur in the beginning of multiconsonantal onsets

[4] On the other hand, Kaye (1992) used the Ancient Greek perfect reduplication, in which the initial *st* does not behave like other branching onsets, as a proof that *s* is not part of a complex onset at all, but the coda of the preceding syllable, cf. AGr. *gra... → gegra..., bla... → bebla...*, but *stra... → estra...* (**sestra...*). For more on this, with examples from Italian, see below in § VI. In Sanskrit verb reduplication, when the verb begins with a consonant cluster, the reduplicant invariably has a less sonorous of two sound, cf. *krand- → a-ci-kradam* 'cry' (AOR), *stu- → tu-ṣṭav* 'praise' (AOR), *skand- → a-ca-skandam* 'leap' (AOR) (Kennedy 2011:2860).

preceding stops and affricates, for example in Croatian, where there is the unique *ht* as well (verb *htjeti* 'want' and its derivatives):

spor	'slow'	zbor	'assembly, choir'
splav	'raft'	zbroj	'summa'
star	'old'	zde.nac	'well'
strah	'fear'	zdrav	'healthy'
skok	'jump, leap'	zgib	'pull up'
skra.ti.ti	'shorten'	zglob	'joint, ankle'
špa.ga	'rope'	žbir	'cop'
štru.ca	'loaf'	žde.ra.ti	'devour'
šče.pa.ti	'grab, seize'	ždral	'crane'
śću.ću.ri.ti se ⟨šćućuriti se⟩	'crouch, cower'		
htjeti	'want'		

Since we encounter them word-initially, there is no reason not to postulate that they are possible in medial positions:

Go.spa	'Madonna'	go.zba	'feast, banquet'
i.spra.vi.ti	'correct'	zvje.zda ⟨zvijezda⟩	'star'
go.sta (GEN)	'guest'	mo.zga (GEN)	'brain'
Íe.stve ⟨ljestve⟩	'ladder'	tu.žba	'complaint, charges'
gu.ska	'goose'		
pi.sca (GEN)	'writer, author'	mi.ra.žži.ja ⟨miraždžija⟩	'the one who weds for dowry'
ma.šta	'imagination'		
ju.na.štvo	'heroism'	gro.źźe ⟨grožđe⟩	'grapes'
gre.ška	'mistake'		
pa.šče	'dog, cur'		
li.śće ⟨lišće⟩	'leaves'		

Initial sC clusters are, therefore, found in Slavic languages (e.g. Pol. *ściana* 'wall', *szczwany* 'cunning', *zdanie* 'sentence', *źdźbło* 'blade /of grass/', see Cyran, Gussmann 1999:225), in Germanic languages (e.g. E. *spoon*, *strong*, Germ. *Spiel* 'game', *Strom* 'current', *stark* 'strong'), in Celtic languages (e.g. Breton *splann* 'bright', *sklaer* 'clear', see Stephens 1993:356). The history of Romance languages shows that the onset fricative [s] preceding a stop is not a completely natural phenomenon, which is why, as a rule, they introduced before it the prosthetic vowel [e] or [i], which led to resyllabification (cf. Alkire, Rosen 2010:26—28, the examples that follow

are taken from there, while the syllabification is ours).[5] Italian lost the Old Italian prosthetic *i* and — with the exception of several fossilized phrases — it can be found neither in inherited words nor in new loanwords; French has retained the prosthetic [e] (with the *s*-deletion), but prosthesis is no longer an active rule for words introduced later or for more recent loanwords; in Spanish, *e*-prosthesis is an active rule:

Lat.	spa.ta	'sword'	
	stri.de.re	'hiss'	
	scri.ptum	'written'	
It.	spa.da	'sword'	(OIt. is.pa.da)
	sport	'sport'	
	per is.crit.to	'in writing'	
Fr.	é.pée	'sword'	
	é.tude	'study'	
	sport	'sport'	
Sp.	es.pa.da	'sword'	
	es.cor.pi.ón	'scorpion'	
	de.por.ti.vo	'sports' (ADJ)	

Speaking of dead and active phonological alternations, let us mention that Croatian has no active *a*-insertion rule in branching codas other than *st*, *št*, *zd*, *žd* (cf. Marković 2013), and that loan codas include the fricative *s* to the right of a stop or between two stops:

Cr.	kiks	'gaffe'	*kikas	gips	'plaster'	*gipas
	seks	'sex'	*sekas	šnaps	'schnapps'	*šnapas
	boks	'boxing'	*bokas	ko.laps	'collapse'	*kolapas
	tekst	'text'	*tekast	bi.ceps	'biceps'	*bicepas

Italian will be discussed again later (see § VI). This lengthy introduction is to serve as a reminder that the basic lexicon of languages can comprise syllables that violate the Sonority Sequencing Principle. This applies also to Croatian. When Jelaska writes that, in allegro speech, »it is permitted to partially violate the characteristic constraints for sequences, but not the Sonority Sequencing Principle« (2004:175), one must keep in mind that the universal Sonority Sequencing Principle is in fact constantly, *nolens volens*, violated in Croatian (cf. initial clusters in Cr. expressions *stalno* 'constantly', *htjeli-ne htjeli* 'nolens volens'). Onset sC clusters exhibit the same

[5] Other textbook examples could be words for *student*, *sport*, *school* or *Spain* in these languages.

behaviour in Croatian as the one Matasović (1997b) ascribed to Proto-Indo-European, i.e. they behave as single consonants. In Croatian, Škarić's formulation (1991:337, §§ 866—867) fully applies to them:[6]

> Tightly coalesced articulation is found in groups /st/, /št/, /zd/ and /žd/, but also in others, where the first consonant is fricative /s/, /š/, /z/ and /ž/, and the second is any stop consonant (those groups are /sp/, /šp/, /žb/, /zb/, /sk/, /šk/, /zg/, /žg/). If those consonant groups occur in an intervocalic position, syllabification is such that both consonants belong to the beginning of the following syllable. [...] When the beginning of a triconsonantal group consists of tightly coalesced groups /st/, /št/, /zd/ and /žd/, the syllable boundary does not separate them, and consequently both such consonants either join the third in the next syllable, resulting in V-CCCV, or the syllable boundary falls behind them.

It is questionable, however, whether that explains anything regarding the sonority of sounds and the universal syllable structure or merely states the facts, which was — regarding the universal frequency of onset clusters *st*, *ht*, *vd* and coda clusters *ts*, *dz*, *kš* — already noted by Ohala (1992:323—324). And, of course, if initial [s] is viewed not as a part of a complex onset, but as a rhyme with an empty nucleus, which in some languages, e.g. Spanish, is actually filled with a realized vocal (see § VI below and also Gussmann 2002:107—115; Goad 2011), the issue of the sC onset clusters does not arise at all.

III. The level of sonority of sounds rises from the beginning of the syllable to its peak (nucleus) and falls from the peak to the end of the syllable. — This, in a nutshell, is the Sonority Sequencing Principle, a strong universal tendency with some exceptions (Blevins 2006:333—334; Parker 2011:1164; Topintzi 2011:1287), a common-place of every recent phonology coursebook.[7] The higher the sonority of the sound, the greater the probability for the sound to be closer to the peak of the syllable. In order to ascertain the possible arrangements and sequences of sounds within the syllable, one must make sonority hierarchies of sounds — a universal one, and one for each individual language. Linguists have been doing this for no less than 250 years.[8] One of the first notable universal hierarchies was provided by the well-known Dane O. Jespersen (1904:186):

[6] On this matter, with a different theoretical point of departure and the same conclusion, see also Mihaljević (1991:46—47) and Jelaska (2004:114—117).

[7] For an extensive account of the history of establishment of the principle, see, e.g., Parker (2002).

[8] Ohala (1992:319) tracks the oldest rudimentary hierarchy in the work by Ch. de Brosches back to 1765.

1 (a)	voiceless stops	[p, t, k]
(b)	voiceless fricatives	[f, s, ç, x]
2	voiced stops	[b, d, g]
3	voiced fricatives	[v, z, ʒ][9]
4 (a)	nasals	[m, n, ŋ]
(b)	laterals	[l]
5	*r*-sounds	
6	high vowels	[y, u, i]
7	mid vowels	[ø, o, e]
8	low vowels	[ɔ, æ, ɑ]

We quote it for several reasons. First, with some minor finishing touches, all contemporary hierarchies are very similar to it. Second, one should recall the circularity of the sonority definition (cf. Ohala 1992). Sonority is a relative measure and is usually associated with the tension of articulators, aperture of the vocal tract and loudness of sounds. It is, therefore, not measurable in and of itself. In other words, one of the ways to establish the sonority of a particular sound is to establish its positions within the syllable and then assign to it the level of sonority, so that we may then explain its possible positions on the grounds of its thus established sonority. Naturally, all of it is based on the assumption that we know in advance what the syllable is, i.e. which sounds belong to a particular syllable, and which do not. Therefore, we "know" that Cr. *stranka* [straŋka] 'party' is a bisyllabic word and that the syllable boundary falls between [ŋ] and [k], and not, for instance, between [a] and [ŋ]. And that we know because no Croatian word begins with *nk*. This leads us to the conclusion that [ŋ] is more sonorous than [k]. In the second step, we conclude that no Croatian word begins with *nk* precisely because [ŋ] (the allophone of /n/) is more sonorous than [k]. Even if we were to accept it, we are still left with the onset *st*, i.e. *str* (which occurs in *stranka* and in all examples in § II), which we then still consider an exception. The present paper does not intend to resolve anything in that respect, it only wishes to affirm that it takes into consideration the fundamental problem regarding sonority. Third, Jespersen's hierarchy encompasses no affricates — the sounds that are of interest in this paper — and this would apply to the majority of future hierarchies (see Parker 2011:1176). The ones that do encompass affricates, classify them differently, in one of the three following ways: affricates < stops, affricates > stops, or affricates = stops (Parker 2002:70; on the nature of affricates see also Lin 2011).

[9] The third symbol is unclear, apparently it should have been [ð], a voiced interdental fricative.

Keeping all that in mind, we will take, for the purposes of orientation, three recent hierarchies which do encompass affricates, and, what is more, in which affricates are differently placed. Due to limited space, we will quote them only up to nasals. First, Parker's (2002) universal hierarchy which equates affricates with stops in terms of sonority.[10] Faced with varied data obtained in varied research, Parker writes: »my phonetic results [...] strongly support the classification of affricates as statistically indistinguishable from their corresponding stop cognates in terms of the five correlates of sonority I investigate« (2002:71—72).

Universal Sonority Hierarchy (Parker 2002:240, exhaustive version)

1 voiceless stops and affricates
2 voiceless fricatives / voiced stops and affricates
3 voiced stops and fricatives / voiceless fricatives
4 voiced fricatives
5 *h*
6 nasals
[...]

Second, Parker's (2008; 2011) hierarchy of relative sonority. In one of his recent papers Parker emphasizes that »the placement of affricates between stops and fricatives is a controversial issue, remaining open to disagreement. Many scales either leave affricates out entirely or group them with plosives, using a term such as *stops*« (2011:1178).

Final hierarchy of relative sonority (Parker 2008, cited in Parker 2011:1177)

1 voiceless stops (including [ʔ])
2 voiceless affricates
3 voiceless fricatives (including [h])
4 voiced stops
5 voiced affricates
6 voiced fricatives
7 nasals
[...]

[10] Parker (2002) approaches the assessment of sonority through an experiment with five criteria — intensity, frequency of the first formant (F_1), total segmental duration, peak intraoral air pressure, and combined oral-plus-nasal air flow. The experiment showed that the highest correlation is the one between sonority and intensity. He considers the hierarchy established on the basis of the English and Spanish languages to be universal — it is part of Universal Grammar, no language makes full use of its possibilities.

Third, Jelaska's (2004) Croatian hierarchy, which takes into account the older Croatian hierarchies, and which assigns to affricates one-grade-lesser sonority than to stops.

Croatian Sonority Hierarchy (Jelaska 2004:147)

1	1.1	voiceless stops	p t k
	1.2	voiced stops	b d g
	1.3	voiceless affricates	c č ć
	1.4	voiced affricates	ǯ ǵ
	1.5	voiceless fricatives	s š f h
	1.6	voiced fricatives	z ž
2		labial sonants	v m
3		nasals	n ń
[...]			

IV. We will refer to three relevant works to show how sequences of affricates and stops in a syllable are treated in Croatian linguistics. Škarić (1991:336, § 863) lays down the following rule:

> If two consonants occur in the intervocalic position, the first being on a higher level of sonority, and the second on a lower level, in syllabification the two consonants must be separated, and in normal fluent speech, the syllable boundary falls between them.

Based on what has been said in § III, this would then also apply to clusters of affricates and stops, but we cannot jump to such a conclusion, since Škarić puts all voiceless and all voiced consonants on the same level of sonority (1991:133, § 221, 330, § 844). Consequently, he finds that »both /tko/, /psi/, /špe/, /ćki/, etc. and /kto/, /spi/, /pše/, /kći/ are acceptable structures [Cr. *postave*]« (1991:331, § 847).

In her seminal study, M. Turk (1992:81) discerns twelve kinds of biconsonantal medial groups. Some among them are proper (Cr. *prave*), tautosyllabic (belonging to the same syllable), and some are not-proper (Cr. *neprave*), heterosyllabic (divided by a syllable boundary). In the heterosyllabic ones she includes the affricate + stop group. It is, therefore, perceived that such groups do not belong to the same syllable. Here are some of the examples (see Turk 1992:90; we consistently follow the source notification):

ct	octa (GEN)	'vinegar'
ck	kljuckati, bratski, gradski	'peck', 'brotherly', 'city' (ADJ)
čk	igračka, ručka	'toy', 'handle'
ćk	plećka, voćka, smećkast	'shoulder (of an animal)', 'fruit-tree', 'brownish'
ʒb	tuđbina	'foreign country'
ʒg	tisućgodišnji	'thousand-years-old'
žb	jednadžba, narudžba, udžbenik	'equation', 'order', 'textbook'

Among the triconsonantal and quadriconsonantal ones (Turk 1992:93—99) we find several additional examples which we might consider biconsonantal, i.e. presuppose coalescence of articulation of stops and fricatives, especially at word-endings (as Turk does, for instance, with *ctv* in *sudstvo* 'judicature', *prokletstvo* 'damnation', or among the biconsonantal ones with *ck* in *bratski* 'brotherly', *gradski* 'city' (ADJ); cf. also Jelaska 2004:176—177):[11]

dzg	odzgora	'from above'
tsk	odskočiti	'jump off'
tst	predstavnik, podstanar	'representative', 'tenant, lodger'
tšt	odšteta	'indemnity, damages'
tšk	predškolski	'pre-school'
tstr	odstraniti	'remove'
tškr	odškrinuti	'slightly open'
dzdr	odzdraviti	'return a greeting'
ćstv	pokućstvo	'furniture'

Let us repeat that Turk considers all such clusters to be heterosyllabic, not allowing exceptions; for groups of a stop and an affricate, on the other hand, she allows the cluster *pč*, initial in *pčela* 'bee' (1992:81).

Finally, the work by Meštrović *et al*. (2015), which brought a praiseworthy new and meticulously elaborated corpus statistics of syllables in Croatian, failed to shed light on our problem.

[11] Meštrović *et al*. (2015:11) comment that the cluster *čt* »does not occur in the corpus« (the cluster is also mentioned in Turk 1992:81 and Jelaska 2004:169). With the expected combined, fused articulation, it can occur, for instance, in *odšteta* 'indemnity, damages', *odštopati* 'uncork', *kadšto* 'now and then', etc. Accordingly, we do not view the fact that this involves a prefix-stem boundary as decisive with regard to syllabification (as opposed to Jelaska 2004:177; Meštrović *et al*. 2015:12); we do not deny its intuitive importance, but we take it merely as one of the criteria.

V. In this section we present three reasons corroborating the assertion that the Croatian language tolerates clusters of an affricate and a stop — some more, others less — in the syllable onset. The reasons are — first, the existence of words with an initial affricate-stop cluster (§ V.1), second, syllabification in the slang metathesis (§ V.2), and third, syllabification in chanting (§ V.3).

V.1 Clearly, the clusters occurring word-initially are, by virtue of this alone, also onsets to the syllable and, as onsets, can also be postulated medially. Such clusters can be highly frequent, i.e. occur in numerous words of a language, but they can also be extremely rare, even unique (cf. Turk 1992:39, 73—76, typical, non-typical and unique clusters; Jelaska 2004:166, non-prototypicality constraint). Here are some good and well-known examples for non-typicality and uniqueness in Croatian: *pt* (*ptica* 'bird'), *pč* (*pčela* 'bee'), *pš* (*pšenica* 'wheat'), *ps* (*psa* /G/ 'dog', *psovati* 'curse'), *kć* (*kći* 'daughter'), *tk* (*tko* 'who', *tkati* 'weave', *tkivo* 'tissue'), *bd* (*bdjeti* 'keep awake'), *gd* (*gdje* 'where'), *ht* (*htjeti* 'want').[12] Since some occur word-initially, the speaker should not find unacceptable the syllabification *lo.pta* 'ball', *le.ptir* 'butterfly', *ko.pča* 'fastener', *ha.psi.ti* 'arrest', *le.bdje.ti* 'hover', *kli.kćem* 'I exult', *da.hta.ti* 'pant', etc. Naturally, this is highly dependent on the frequency of such words and on the layer of the lexicon they belong to. We can assume that the more frequent and current in everyday usage they are, the more influential their syllable structure will be.

There are words with an initial sequence of an affricate and a stop as well, but they are all rare, obsolete or regional. Still, what matters to us is that they are possible. Jelaska (2004:160) provides several of them, and we have collected data from ARj, KRj and Ivšić (1955—1956).[13] The neutral or contemporary form, if there is one, is put in brackets:

cp	—
čp	čpag (špag, džep suknje) 'pocket of a skirt', čparog (šparoga) 'asparagus', čpijun (špijun) 'spy'
ćp	—

[12] Of course, we can always increase their number by including derivatives (*ptić, ptičji, pčelica, pčelinji, psina, psovka*), as well as secondary lexemes such as loanwords (*psalam, pseudo-, ptero-*), proper names (*Gdynia, Gdańsk*), technical terms, etc.

[13] We will not write out all lexemes, especially not all derivatives, but only as many as necessary to convey the general idea. We do not presuppose the initial [ʒ] ([ʒ] is not a phoneme in Croatian). The dash (—) signifies either that there are no attested words or that they are unique and extremely unusual (like *Džgarija*, town in Serbia, in Aleksinac District — ARj: s. v.).

ct	ctjeti (cvasti, cvjetati) 'blossom'
čt	čtati, čteti, čtiti, čtjeti (čitati) 'read', čtanje, čtenje (čitanje) 'reading', čtilac (čitalac) 'reader', čteta (taština) 'vanity', čtiri (četiri) 'four', čtovati (štovati) 'honour, observe'
ćt	—
ck	cka (daska) 'plank', ckiljeti, ckliti (cakliti, svjetlucati) 'shine', cklo (staklo) 'glass', cknjeti (kasniti) 'be late', ckvara (skvara) 'fat, grease (for hair)', ckvorac (čvorak) 'starling', ckvrljeti 'crackle, render lard', ckvrniti (skvrnuti) 'defile'
čk	čkakljati (škakljati) 'tickle', čkakljiv (škakljiv) 'ticklish', čkalj (čičak) 'burdock', čkalja (škalja, rupa, brlog) 'hole, den', čkati (čačkati) 'poke', čkoda (škoda, šteta) 'damage, harm', čkola (škola) 'school', čkoljka (školjka) 'shell', čkomce 'tacitly, silently', čkometi 'be silent'
ćk	—
ǯb	džban (žban, vrč) 'jug', džbun (žbun, grm) 'bush'
ǵb	—
ǯd	—
ǵd	—
ǯg	džgati (žgati, paliti) (M. Divković, 16th/17th century) 'ignite'
ǵg	—

Clearly there are quite a lot of them. (Our words from the beginning of the paper are also clearly confirmed — there are no initial onsets with a "soft", (alveolo-)palatal affricate before a stop; in Croatian there are no initial sequences ćC and ǵC anyway.)[14] Many of them are forms in which a fricative alternates with an affricate (e.g. *čpag*, *čparog*, *čkakljati*, *čkola*, *džban*, *džgati*...), i.e. it is generated from the same original form (e.g. *čtati*, *čtovati*, *čteta*, *cklo*, *cknjeti*...), which is generally no rarity in Croatian (cf. Jagić 1900./1948;

[14] In her analysis of Croatian onset clusters, Turk (1992:42) lays down a rule of distribution, according to which »Phoneme /ć/ in the obstruent part of the syllable excludes the filling of all positions in the sonorant part of the syllable. (In the syllable there are no clusters such as ćm, ćv, ćr, ćl, etc.).« It is not clear whether this is a fact of distribution or just of statistics (the fact that in Croatian there simply are no word-initial sequences ćC and ǵC). Does this rule exclude the possibility of medial clusters such as *ćn*, *ćń*, *ǵn* (e.g. *no.ćni* 'night' (ADJ), *vo.ćni* 'fruit' (ADJ), *vo.ćńak* 'orchard', *le.ǵni* 'back' (ADJ))? We start from the assumption that one must presuppose also the possibility of the medial cluster *ćk* (e.g. *vo.ćka* 'fruit-tree', *fu.ćka.ti* 'whistle', *vr.ti.ćki* 'kindergarden' (ADJ), *go.spi.ćki* 'Gospić' (ADJ)).

Ivšić 1955—1956; Marković 2013), an affricate even occurs or did occur before sonants and vowels, cf. *smilje → cmilje* 'immortelle', *š*(*k*)*varak → č*(*k*)*varak* 'crackling' (of the same origin as dialectal *ocvirak* 'crackling', according to the above-mentioned verb *ckvrljeti*, *ckvrliti* 'render lard'), *žak → džak* 'sack', *šukun- → čukun-* 'grandgrand-', *zora → dzora* 'dawn', *jezero → jedzero* 'lake', *mozak → modzak* 'brain'. There were also opposite cases, such as dialectal *đakon → žakan* 'deacon', *džep → žep* 'pocket', *džigerica → žigerica* 'liver'.[15]

In addition we may mention yet another case of the intermingling of stops, fricatives and affricates — the alternation of a stop or a fricative with [c] before the diminutive verbal suffix *k*, which also results with the affricate-stop sequence *ck* (see Ivšić 1955—1956; Marković 2013:47—48):

bod-k-a-ti	→	bockati	'poke'
glod-k-a-ti	→	glockati	'gnaw a little'
gut-k-a-ti	→	guckati	'sip'
trus-k-a-ti	→	truckati	'shake while riding or driving'
griz-k-a-ti	→	grickati	'nibble'
rez-k-a-ti	→	reckati	'cut a little'
liz-k-a-ti	→	lickati	'lick a little'

It all goes to prove that the initial affricate-stop sequences are not unnatural to the speakers. On the contrary. Lexemes with *čk* such as *čkomiti* 'be silent, hold one's tongue' or (*po*)*čkaljiti* 'trip up' (cf. *čkalja*) are included in contemporary dictionaries as well (e.g. HJR: s. v. *čkâlj*, *čkòmiti*, *pòčkaliti*; RHJ: s. v. *čkâlj*, *čkòmiti*), and they are well known to the speakers — at least in the northern part of Croatia. If that is so, the corresponding medial onset affricate and stop clusters are also natural.

V.2 The data from language games and secret languages in contemporary phonology and morphology are taken as independent, external proof of assertions regarding linguistic structure (see, e.g., the extensive study Bagemihl 1981). Mihaljević (1991:76—78) shows that the game of syllable insertion strictly follows the syllable boundaries, while Marković (2016) demonstrates that strict syllabic rules govern the complex Croatian slang metathesis with *jo-...-ń*-circumfixation and that the ultimate newly-created form infallibly respects the Croatian syllable structure. The same applies to plain metathesis. If examples like:

[15] Along with regular alternations as in *čto → što*, *čtovati → štovati* (see Matasović 2008:§ 199; Marković 2013:25).

pusti (2.SG.IMP)	'let go'	→	sti.pu
ništa	'nothing'	→	šta.ni

are but two out of many corroborations of onset fricative-stop clusters, examples like:

pička	'cunt'	→	čka.pi
Prečko	(borough of Zagreb)	→	Čko.pre
pičkica	'little cunt, pussy'	→	čki.ca.pi, ič.ki.ca.pi

prove that *čka* and *čki* are in fact syllables, that *čk* is in fact an onset, and that source words should be syllabified *pi.čka*, *Pre.čko*, and *pi.čki.ca* respectively (the form *ičkicapi*, with a repeated nucleus vowel, presupposes the syllabification *pič.ki.ca*; see also § V.3). Contemporary phonology resorts to made-up examples and experiments (see Vaux 2011), which allows us to rely on our language competence and transpose the examples listed in the beginning (see § I):

kocka	→	ckako	ockako
mačka	→	čkama	ačkama
praćka	→	?ćkapra	aćkapra
voctvo ⟨vodstvo⟩	→	ctvo.vo	octvo.vo
sržba ⟨srdžba⟩	→	žbasr	?ržbasr

In the first two examples we find two variations, with onsets *ck* and *čk* and with a repeated nucleus, which then impacts the syllabic structure as the prosthetic vowel in Romance languages (see § II). The same applies to the fourth example. Incidentally, metathesis with a repeated nucleus vowel occurs regularly in monosyllabic words in Croatian, e.g. *lud* 'crazy' → *udlu*, *koń* ⟨konj⟩ 'horse' → *ońko*. As for the third example, we would not spontaneously transpose it without "prosthesis", which may have something to do with the non-existence of initial *ćk* in Croatian (see § V.1). The form *ržbasr* is not acceptable to us, while *žbasr* is, unexpectedly, fully acceptable and transparent. We would transpose in the same way the archaic word *lužba* ⟨ludžba⟩ 'chemistry' → *žbalu*. Such metathesis shows that medial *c* and *č* before *k* are at the very least ambisyllabic (*ko.cka* and *koc.ka*, *ma.čka* and *mač.ka*).

V.3 How is one to establish medial syllable boundaries in controversial cases? How can one obtain the speakers' spontaneity? — One of the possible answers are language games (see § V.2), another is listening attentively to the speakers in situations when they unconsciously — and notably

— syllabify the words of their language, the way they do in chanting. We will provide two types of examples. The first are football fans' choruses, in which we hear different syllabification:

> Bježite, ljudi, bježite iz grada, stiže ekipa pijana, bježite, ljudi, dok postoji nada, jer ovdje igra Hr.va.cka / Hr.vac.ka ⟨Hrvatska⟩
>
> 'Flee, people, flee the city, here comes the drunken lot, flee, people, while there's still hope, because Croatia plays here'

> Dinamo i Hajduk dva su kluba bra.cka / brac.ka ⟨bratska⟩, njima se ponosi čitava Hr.va.cka / Hr.vac.ka ⟨Hrvatska⟩
>
> 'Dinamo and Hajduk are two brotherly clubs, the entire Croatia is proud of them'

Interestingly, in the provocative:

> Malo vas je, malo vas je, pič.ki.ce
>
> 'You are scarce, you are scarce, you pussies'

we regularly hear the heterosyllabic pronunciation, just like in the eponymous song by the band *Kawasaki 3p* (2003).

The second is the chorus of the song by the band *Let 3* entitled »Riječke pičke« 'Rijeka cunts' (2005), which the performers chant and, on top of that, the key syllable is repeated:

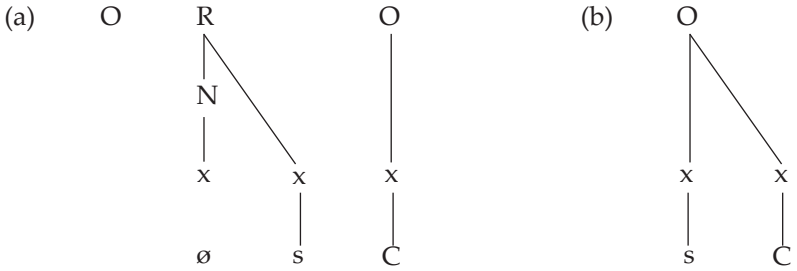
> Rje.čke ⟨riječke⟩ najbolje su čke, čke / vole svoje de.čke / i daju meni pi.čke, pi.čke, čke
>
> 'Rijeka's are the best cunts / they love their boyfriends / and give me some pussy'

This again provides arguments in favour of the acceptability of affricate-stop onsets. We notice that those are regularly *ck* and *čk* clusters. It is a phonotactical fact upon which we have no influence — those are the most frequent affricate-stop clusters in the suffixal zone, and football fans do not sing about *gospodstvo* 'refinement' and *svjedodžbe* 'diplomas'.

VI. Government and Charm Phonology has provided insights relevant to our problem. Government Phonology has several important distinctive traits. Insofar as they are relevant to us, they are the following (see Kaye *et al*. 1990; Charette 1991): first, the theory advocates strict binarity of the components of the syllable, and syllables, in principle, have a CV form. The onset and the rhyme can be branching, but the branching can only be binary. In other words, there are no tripartite onsets and no tripartite rhymes. Moreover, both onset and rhyme can be empty — phonologically unspecified and phonetically unrealized. Coda is no part of the theory, i.e.

what is termed "coda" is the post-rhymal position (Kaye 1990), which is in fact the onset of the following syllable with an empty rhyme (simply put, there can be no closed syllable word-finally, so Cr. *rak* 'crab' is syllabified as *ra.kø*, and Cr. *rast* 'growth' as *ras.tø*, where zero signifies an empty rhyme).[16] The second trait ensues from the first, since onsets are limited to two members, the theory does not take into account the Maximal Onset Principle. Third, sonority plays no role in the theory. Thus there are no sonority hierarchies and no sonority sequencing principle. The arrangement of sounds within the syllable is governed by charm, which can be positive (roughly — vowels), negative (roughly — consonants), and neutral (roughly — sonants).

Based on this, Kaye *et al*. (1990) and Kaye (1992) analyse sequences sC and find, to put it most concisely, that they cannot be onsets or tautosyllabic, that they are always heterosyllabic, i.e. that *s* in them always belongs to the rhyme of the preceding syllable. Consequently, (a) is the valid diagram, not (b) (Kaye 1992):



Languages differ from one another in whether they allow an empty nucleus (N) of the preceding syllable or not. As we have already seen (§ II), Croatian and many other languages allow it, while Spanish does not — instead, it fills the nucleus with a prosthetic vowel. But important proof for such analysis is found precisely in the languages that do have an empty nucleus. Kaye (1992) analyses Italian, Ancient Greek, English and European Portuguese. We have mentioned Ancient Greek above (see note 4), now let us also look into Italian.

First, the Italian stressed vowel must occur in a two-position rhyme, i.e. there is either a branching nucleus in an open syllable (e.g. [pé:lo] 'hair', [ká:pra] 'goat'), or a branching rhyme in a closed syllable (e.g. [mánto] 'coat', i.e. [mán.to]). Furthermore, sequences sC behave as in the latter case (e.g. [pásta] 'pasta' as [mánto], not *[pá:sta] as [ká:pra]). What we have here are word-medial positions, which is why the argument need not be

[16] Cf. also more recent insights in Van der Hulst, Ritter (1999).

solid, but the next two have to do with initial positions.

Second, the masculine definite article takes the form *il* before the filled onsets (e.g. *il costo* 'the cost', *il treno* ' the train', *il sale* 'the salt'), and the form *lo* before the empty ones (e.g. l'arco 'the arch'). Before the sequence sC, the form is — *lo* (e.g. *lo studente* 'the student', **il studente*, *lo scuro* 'the darkness', **il scuro*), i.e. the same as before the non-filled onsets. Accordingly, *s* in sC is no part of the onset, the onset is empty.

Third, initial onsets gemminate when positioned after the final stressed vowel (underlined):

é caríno	[ékkaríno]	'it is pretty'
città tríste	[čittáttríste]	'sad city'
caffè fréddo	[kaféffréddo]	'cold coffee'

The sequence sC does not behave like that, but again as if *s* were not part of the onset:

città straniéra	[čittástraniéra]	'foreign city'	*[čittásstraniéra]
caffè spésso	[kaféspésso]	'thick coffee'	*[kafésspésso]

It remains an enigma why in languages the sound *s* has such a "magical nature" (Kaye 1992), i.e. why in many languages precisely that sound can be part of the rhyme with an empty nucleus.[17]

Cyran and Gussmann (1999; see also Gussmann 2007:210—220) applied all that to Polish, the language of markedly complex onsets, which, moreover, is Slavic and similar to Croatian in terms of sounds. Here are several examples of syllabification:

ptak	'bird'	pø.ta.kø
drgać	'shudder'	drø.ga.ćø
tknąć	'touch'	tø.kø.ną.ćø
stół	'table'	øs.to.łø
dźgnąć	'stab'	ʒø.gø.ną.ćø
źdźbło	'blade (of grass)'	øź.ʒø.bø.wo

What must one note with regard to Croatian? — First, phonetically not realized nuclei in Slavic languages are not to be dismissed, since vowel alternations both in the root (ablaut) and in the suffixal zone (insertion of mobile vowels) do occur in them, cf. Polish *ptak* 'bird' with etymologically

[17] Goad similarly concludes: »In spite of the quantity of research that has been undertaken on sC clusters, it is perhaps most evident that more needs to be done before the issue of their representation can be resolved (if ever)« (2011:920).

identical Croatian words *ptica* 'bird' and *patka* 'duck', as well as the suffixal zone in *patak* 'drake', with an inserted *a* (the morphemic analysis is given in parentheses):

ptica	'bird'	(pt-ic-a)
patka	'duck'	(pat-k-a)
patak	'drake'	(pat-k-ø)

Accordingly, one could perceive in the same way the optional occurence of phonetically realized vowels in Croatian examples like *cklo → caklo* (*staklo*) 'glass', *ckliti se → cakliti se* 'shine', *čtati → čitati* 'read', *s-trti → satrti* 'crush, shatter', *s-brati → sabrati* 'gather', etc.

Second, in the final two of Polish examples we see that, in such an outline, the affricate-stop sequence *ʒ́b* is heterosyllabic, but the affricate is in the onset instead of being treated as an initial fricative. In Croatian we would prefer to lean towards placing the affricate in the rhyme of the first syllable, just like the fricative, for, as we have seen, such initial sounds in Croatian alternate, cf. Cr. *žban* or *džban* (Pol. *dzban* 'jug') — *øž.ba.nø* or *øǯ.ba.nø*.

Third, the analysis is markedly at variance with a native speeker's elementary intuition, i.e. one must get used to the fact that in the analysis Cr. *stol* is a trisyllabic word with a fricative in the rhyme of the first syllable. This may have laid down a fantastic theory, but we are not sure that the language data have been explained. At any rate, the sole aim of this section was to demonstrate that the subject discussed in the paper can be viewed in a completely different way.[18]

VII. Let us concisely put forward the concluding remarks. We deem that affricate-stop sequences can be onsets clusters of the Croatian syllable. Accordingly, the answer to the initial question would be as follows:

ko.cka	'cube'
ma.čka	'cat'
pra.ćka	'catapult, slingshot'
voc.tvo, vo.ctvo	'leadership'
sr.ǯba	'anger'

[18] Yet another insight into the violation of the Sonority Sequencing Principle is provided within the framework of the Optimality Theory. Cross-linguistic differences in allowing sC clusters are explained by a different ranking of the SONORITY constraint. In Croatian it is ranked lower than FAITHFULNESS. The constrastive hierarchy of syllable constraints for English and Croatian is given in Josipović Smojver (2017:213; see also references therein).

Three reasons were put forward, no more and no less, in favour of such syllabification. One has to do with the initial position, the other two with the medial one. Here are the reasons.

First, some sequences of dental-alveolar and postalveolar affricates and stops (*ck*, *čk*, *čp*, *ʒb*) can occur word-initially (§ V.1), which undoubtedly makes them possible onsets. The small number of such words makes such onsets non-prototypical, not impossible. In those positions, such clusters alternate with fricative-stop clusters (*sk*, *šk*, *šp*, *žb*), which are in and of themselves unusual in all Indo-European languages.

In sequences which do not occur word-initially or which are unique in obsolete or dialectal words (*cp*, *ct*, *ʒd*, *ʒg*, cf. *ct* in genitive form *octa* 'vinegar'), particularly if they are triconsonantal (cf. *ctv* in *vodstvo* 'leadership'), the bisyllabic principle is expected (Jelaska 2002:176), just like in quadriconsonantal words (cf. *ćstvo* in *pokućstvo* 'furniture', with an (alveolo-)palatal affricate), where we can expect the predominance of heterosyllabic pronunciation.

Sequences with (alveolo-)palatal affricates (*ćk*, *ćp*, *ćt*, *ʒ́g*, *ʒ́b*, *ʒ́d*) do not occur word-initially. We may add that in Croatian, in general, there are *no* initial clusters ćC and ʒ́C — initial [ć] and [ʒ́] is always followed by a vowel, never by a sonant or an obstruent, and stops are no exception.

Second, in the slang metathesis (§ V.2), as much as can be established based on a limited number of lexemes, affricate-stop sequences can behave as onset clusters (*pička* → *čka.pi* 'cunt').

Third, in chanting (§ V.3), some speakers will syllabify medial affricate-stop sequences into the next syllable, as per the Maximal Onset Principle (*rječki* ⟨riječki⟩ 'Rijeka' (ADJ) → *rje.čki*).

Taken separately, these arguments can be refuted, but taken as a whole, their validity increases. We leave to other researchers to confirm them or disprove them through psycholinguistic and other research with a larger number of interviewees.

A separate problem pertaining to possible affricate-stop onsets is the universal Sonority Sequencing Principle (§ III). With regard to this, we can say three things.

First, if affricates are more sonorous than stops (Jelaska 2004; Parker 2011), then onset affricate-stop clusters violate the Sonority Sequencing Principle in the same way fricative-stop clusters do.

Second, if stops and affricates are of equal sonority (Škarić 1991; Parker 2002), then onset affricate-stop clusters are simply non-typical due to their low occurence frequency in the initial position.

Third, if Government and Charm Phonology (§ VI) is right, then the Sonority Hierarchy is irrelevant, and affricate-stop sequences are always heterosyllabic, i.e. they are not clusters at all.

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Pristupni afrikatno-okluzivni skupovi u hrvatskome

Sažetak

Donose se razlozi zašto afrikatno-okluzivne sljedove valja ubrojiti u prihvatljive pristupe hrvatskomu slogu. Prvo, riječi s inicijalnim afrikatno-okluzivnim skupom (npr. *čkomiti* 'šutjeti') i smjenjivanje frikativa u takvim skupovima s afrikatom (npr. *žbun → džbun*). Drugo, slengovska metateza (npr. *pička → čkapi*). Treće, slogovanje pri skandiranju (npr. *dečko → de.čko*). Ako su prema ljestvici zvonkosti afrikate zvonkije od okluziva, to bi uz poznate pristupne skupove frikativa i okluziva bio još jedan slučaj narušavanja univerzalnoga načela poretka po zvonkosti.

Keywords: syllable, sonority, Sonority Sequencing Principle, Sonority Hierarchy, affricates, Croatian language

Ključne riječi: slog, zvonkost, načelo poretka zvonkosti, ljestvica zvonkosti, afrikate, hrvatski jezik