

Aspect shifts in Indo-Aryan

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Abstract

The grammaticalization literature notes the cross-linguistic robustness of a diachronic pattern involving the aspectual categories resultative, perfect, and perfective. Resultative aspect markers often develop into perfect markers, which then end up as perfect plus perfective markers. We introduce supporting data from the history of Old and Middle Indo-Aryan languages, whose instantiation of this pattern has not been previously noted. We provide a semantic analysis of the resultative, the perfect, and the aspectual category that combines perfect and perfective. Our analysis reveals the change to be a two-step generalization (semantic weakening) from the original resultative meaning.

Keywords: Aspect, Grammaticalization, Semantic Change, Indo-Aryan Perfect, Perfective

1. Introduction

Large-scale grammaticalization studies have produced a number of typological generalizations about shifts in the meaning of tense-aspect categories characterized by three properties: (a) The categories involved in the shifts are stable across cross-linguistic instantiations; (b) The paths of change are unidirectional; (c) The shifts are uniformly generalizing (Heine et al., 1991; Bybee et al., 1994; Haspelmath, 1999; Dahl, 2000; Traugott and Dasher, 2002; Hopper and Traugott, 2003; Kiparsky, 2005). A well known trajectory is the one in (1).

(1) RESULTATIVE \gg PERFECT \gg PERFECTIVE

The morphological marking denoting resultative aspect diachronically generalizes to denote the perfect, including the resultative perfect, and further, to encompass the perfective as well (Dahl 1985, 2000; Bybee et al 1994). Romance languages and Chinese are familiar instantiations of the successive changes in (1). Our own comparative study of distinct diachronic stages in Indo-Aryan, which we document here, reveals that Indo-Aryan also exhibits these two aspect shifts.

The trajectory in (1) naturally gives rise to three questions: What is the semantic content of the resultative, the perfect, and the perfective categories? What logical relation in the meanings of these categories allows the construal of these shifts as generalizations? What is the motivation for the shift from one stage to the next? In this paper we answer the first two of these questions through a close examination of the Indo-Aryan diachronic facts. Our analysis of the meaning of the resultative, the perfect, and the perfective enables an analysis of the diachronic pattern as a two-step generalization (semantic weakening) from the original resultative meaning.

Although the perfect to perfective shift has been taken to involve semantic bleaching with an extension in the range of uses across time (Schwenter, 1994; Schwenter and Cacoullos, 2008; Bybee et al., 1994, a.o.), this extension has not been explicitly treated as a systematic generalization. Specifically, previous accounts are compatible with an ambiguous meaning for the forms that participate in the grammaticalization shift. The precise mechanism which introduces this ambiguity between perfect and perfective meaning is left unspecified. The generalization analysis we propose is the first explicit proposal to our knowledge for the resultative to perfect and perfect to perfective shifts.

In Section 2 we describe the three distinct stages of Indo-Aryan with reference to the changing meaning of an originally (result) stative morphology, *-ta*, and establish that it systematically undergoes the resultative to perfect to perfective shift, a fact gone largely unnoticed in the vast literature on Indo-Aryan. In Section 3 we characterize the meanings of the aspectual operators that are involved in the analysis of *-ta* across the delineated stages. The first diachronic generalization effects a change such that one of the entailments of the resultative, namely that of the prior occurrence of an event of the type denoted by the lexical predicate, becomes part of the meaning of the operator at a later stage (the perfect stage). The second diachronic generalization associates with the aspectual operator a more general relation for instantiating eventuality descriptions within temporal intervals. In Section 4 we discuss the implications of our analysis for theories of language change.

2. Indo-Aryan Stages

The Indo-Aryan branch of Indo-European inherited a deverbal result stative adjectival participial form with the affix *-ta* (allomorph *-na*) attached to the verb root. The distribution and interpretation of this form undergoes systematic expansion across the history of Indo-Aryan, instantiating at three historical stages the three points in the trajectory in (1). We establish this by providing original data for the distinct readings available to the *-ta* form at each of these stages and distributional diagnostics, such as presence of overt agents, compatibility with particular temporal adverbials, use in narrative discourse, etc. The three stages of Indo-Aryan are given in (2). The rightmost column gives the texts representative of the delineated periods, from which we extracted the empirical data.

(2) The Chronology

TIMELINE	STAGE	LANGUAGE	SOURCE
1900BCE-1100BCE	I	Early Vedic	Ṛgveda (RV)
1000BCE-200BCE	II	Later Vedic	Baudhāyana Dharma Sūtra (BS) Bṛhaddevatā (BD) Bṛhadāraṇyaka Upaniṣad (BAU)
300 BCE-700CE	III	Middle Indic	Vasudevahimṇi (VH)

(Approximate dates from Witzel (1999); Jamison and Witzel (1992); Alsdorf (1936))¹

In the earliest stages of Indo-Aryan (Early Vedic), *-ta* always attaches to the root of a change of state verb whose meaning makes reference to a result state. The *-ta* form is a predicate with two distinct but related readings. On the first reading, like English deverbial adjectival participles, it predicates a stative property corresponding to the verb's result state of the verb's direct object argument in both attributive and predicative positions (e.g., *hide x* → *x is hidden*, *hidden x*). Despite the restriction to change of state verbal roots with an associated result state, the *-ta* form does not entail the existence of a prior event of the type denoted by the corresponding verb (just like *x is hidden*, *hidden x*). On the second, resultative reading, the *-ta* form is in a predicative position and the sentence entails the existence of a prior event of the type denoted by the corresponding verb (like *x has been hidden* on the resultative construal of the perfect). It is the second reading that is of primary concern to this paper because, as we view it, it is the one which undergoes the semantic change. The distribution of *-ta* forms on the first reading remains constant throughout. At stage II, *-ta* exhibits the resultative, the existential, and the universal perfect readings, patterning like a regular perfect marker. In stage III, while retaining its resultative, existential, and universal readings, *-ta* is also regularly used in narrative discourse and is compatible with past referring definite frame adverbials giving rise to the implication that the described eventuality occurred within the time specified by the frame adverbial.

(3)

READINGS	Resultative Stage I	Perfect Stage II	Perfective Stage III
Resultative perfect	✓	✓	✓
Existential perfect	∅	✓	✓
Universal perfect	∅	✓	✓
Eventive/Past	∅	∅	✓

Before we move on, let us summarize what the labels we use for the readings amount to, by relating them to the English perfect and perfective.² The resultative perfect applies to predicates of events with associated result states and asserts that the relevant state holds at the reference time as a result of an event of the type denoted by the verb having occurred. For instance, *John has put the cake in the oven* implies that the cake is now in the oven as a result of John's putting it there. The existential perfect applies to predicates of any type and has a backshifting effect: it asserts that the predicate holds at some time before the reference time. For instance, *John has visited Korea many times* implies the past

occurrence of many separate visits to Korea by John. On the universal perfect reading, the predicate is understood to have continuously held throughout an interval stretching from some time in the past up to the reference time, as in *John has lived in Korea for the last three years*. With perfective aspect a predicate is asserted to hold within the reference time. Sentences with perfective aspect are typically used in narrative discourse to advance the reference time, contrasting with the perfect aspect in this respect. Compare *John iced the cake. He (then) went shopping* with # *John has iced the cake. He (then) went/has gone shopping*. The English perfect morphology, unlike the German or French perfect, does not express perfective aspect and cannot be used in narratives (de Swart and Molendijk, 2001; Pancheva and von Stechow, 2004).

2.1. Early Vedic: Stage I

2.1.1. Plain stative and result-stative readings of *-ta*

Much of the literature on Sanskrit treats *-ta* as used to refer to events occurring in an indefinite or proximate past time (e.g., Whitney 1889: 340, 362; Speijer 1886: 4), or as expressing exclusively the result state of an action (Jamison, 1990), or a completed action whose results persist in the present (e.g., Keith, 1909: 247). We agree with the latter authors that *-ta* does not have a past perfective reading at Stage I (Vedic), but we distinguish between two *stative* readings available to *-ta* – a distinction in use that has already been noticed by Vedic scholars focusing on the temporal and aspectual semantics of the Sanskrit verbal system (Wackernagel, 1954: 583; Delbrück, 1888: 385).³

These two readings — the plain stative and the result stative readings — are illustrated below.⁴ In (4a), the *-ta* form predicates of the tree the state of being fixed/established in a certain location, and it certainly does not imply any event that resulted in the coming about of this state. (4b) is part of a characterizing description of Maruts (minor storm deities), which enumerates stable attributes of these deities rather than describing a result state obtaining from a prior event. The visors are understood as being in a spread-out position without there being a prior event by which they come to be in such a position. (4c) is an example of a prenominal attributive *-ta* form, derived from the root *su* ‘press’, that agrees in case and number with the head noun it modifies, *soma*.

- (4) a. *kāh svid vṛkṣó niṣṭh-ito mādhy-e árṇas-o*
 Which indeed tree.NOM.SG fix-PERF.M.SG middle-LOC.SG sea-GEN.SG
yá-m taugryó nādhī-tāh paryáśasvaj-at
 which-ACC Taugrya.NOM.SG supplicate-PERF.M.SG cling-IMPF.3.SG
 ‘Which tree (was it) that *was fixed* in the middle of the sea, to which Taugrya (the son of Tugra), supplicated, was clinging to?’ (RV.1.182.7)
- b. *agníbhṛājas-o vidyút-o gábhastiy-oḥ síprā-ḥ*
 fire.glowing-NOM.PL lightning-NOM.PL hand-LOC.DU visor-NOM.PL
śīrṣá-su víta-tā hiraṇyáyī-ḥ
 head-LOC.PL spread-PERF.M.PL golden-NOM.PL
 ‘Lightenings glowing with fire are on your hands; visors wrought of gold *are spread* on your heads.’ (RV. 5.54.11)

- c. *indrāvaruṇā sutapāv* *imá-m̄* **su-tá-m̄**
 IV.NOM.DU soma.drinker.NOM.DU this-ACC press-PERF-ACC.M.SG
sóma-m̄ *piba-tam*
 soma-ACC.M.SG drink-IMP.2.DU
 ‘O Indra and Varuṇa, the pressed-juice (Soma) drinkers, drink this *pressed* Soma.’ (RV 6.68.10a)

The plain stative reading of *-ta* forms contrasts with their result stative reading, asserting the existence of a prior event and the result state it brings about. This is the familiar resultative reading of the perfect aspect, where the result state of the event is understood to hold at the contextually salient reference time. This reading of *-ta* becomes salient in the presence of agentive and instrumental phrases, as well as adverbial modifiers of the underlying eventive predication. In (5a) the three short clauses with *-ta* are understood to describe three events essential to the preparation of the Soma drink and undertaken in order to offer the drink to Indra. In (5b) the result stative reading becomes salient because of the presence of the agentive phrase. In (5c) and (5d) the result stative reading is again made prominent by the presence of the benefactive dative-marked arguments.

- (5) a. *nṛ-bhir* **dhū-táḥ** **su-tó** *ásnaiḥ* *áv-yo*
 man-INS.PL wash-PERF.M.SG press-PERF.M.SG stone-INS.PL wool-GEN.SG
vāra-iḥ **páripū-taḥ**
 filter-INS.PL strain-PERF.M.SG
 ‘It (the Soma) *has been washed* by men, *pressed* with the help of stones, *strained* with wool-filters.’ (RV 8.2.2)
- b. *johūtr-o* *agní-ḥ* *prathamá-ḥ* *pitéva*
 neighing-NOM.SG agni-NOM.SG first-NOM.SG father.NOM.SG like
iláspad-e *mánuṣ-ā* *yát* **sámid-dhaḥ**
 worship.seat-LOC.SG man-INS.SG PRT kindle-PERF.M.SG
 ‘Agni, neighing, the first one, like a father, *has been kindled* by man upon the seat of worship.’ (RV. 2.10.1)
- c. *ayám hí te* *śunáhotre-ṣu* *sóma* *índra* *tvā-yá*
 this FOC you.GEN.SG S-LOC.PL soma.NOM.SG indra.VOC you-DAT.SG
párisík-to *mád-āya*
 sprinkle-PERF.M.SG delight-DAT.SG
 ‘This Soma juice *has been sprinkled* among the Sunahotras, in love, for your delight, Indra.’ (RV 2.18.6c)
- d. *tú-bhyam* **su-tó** *maghavan* *tú-bhyam* **ábhr-tas**
 you-DAT.SG, press-PERF.M.SG maghavan-VOC you-DAT.SG offer-PERF.M.SG
 ‘For you, Maghavan, it (the Soma) *has been pressed*, for you, it *has been offered*.’ (RV. 2.36.5)

(6) illustrates the two readings of a *-ta* form with the same verbal root *yuj* ‘yoke’. In (6a) the state of being yoked is predicated of the bull and the dolphin (a prior yoking event is inferrable, but arguably not part of the meaning of the sentence.). In (6b) the state of being yoked is understood to be brought about by a prior event of yoking, which is clearly what the adverbial modifier *by means of prayer* is associated with.

- (6) a. *yád áyā-tam dīvodās-āya vartī-ḥ... revád*
 when come-IMPF.2.DU D-DAT.SG abode-ACC.SG riches.ACC.SG
uvāh-a sacan-ó ráth-o vām vṛṣabhá-ś
 carry-PFCT.3.SG good-M.PL chariot-NOM.SG you.GEN.DU bull-NOM.M.SG
ca śimśumāra-ś ca yuk-tā
 and dolphin-NOM.M.SG and yoke-PERF.M.PL
 ‘When you (Aśvins) *came* to Divodāsa, (to his) abode, your chariot *carried*
 rich goods. A bull and a river dolphin *were yoked* to it.’ (RV 1:116:18)
- b. *ātiṣṭha vṛtrahan rátha-m yuk-tā te*
 mount.IMP.2.SG Vṛtra-slayer.VOC chariot-ACC.SG yoke-PERF.M.DU your
bráhman-ā hárī
 prayer-INS.SG steed.NOM.DU
 ‘Mount the chariot, O Slayer of Vṛtra (Indra), your steeds *have been yoked* by
 means of prayer.’ (RV 1:84:3)

2.1.2. *-ta as the resultative operator*

Having established that *-ta* has a resultative reading distinct from the plain stative reading, characteristic of its Indo-European origin as a deverbal adjective, we proceed to show that as an aspectual operator, it has only the resultative reading and not the larger range of readings associated with the more general perfect operator (specifically the existential and the universal perfect readings). This larger range of readings is available to the reduplicated perfect at this stage (Renou 1925; Dahl 2008). Nor does *-ta*, contra most standard grammars, have a perfective reading, with past eventive reference at this stage (contrast with the Aorist, whose perfective status is under no doubt (Delbrück, 1888; Hoffman, 1967; Dahl, 2008)).

A close survey of Vedic data by Jamison (1990) shows that predicative *-ta* forms are uniformly stative at this stage and overwhelmingly make reference to result states (see also Keith, 1909: 247). Jamison claims that the vast majority of instances of *-ta* forms without the copula at this stage refer to a present result state. We offer three empirical arguments to corroborate her finding that *-ta* forms do not have existential perfect or eventive readings at this stage.

First, we conducted a small study of Sanskrit verbs (n=92) for which the *-ta* form is first attested at Stage I.⁵ The hypothesis was that the availability (as inferred from attestation) of the *-ta* form at this stage should vary with lexical subclasses, if *-ta* denotes result states. Result states are expected to be more easily accessible with change of state verbs. The study presented a striking asymmetry between predicates which encode a change of state and those which do not with respect to the attestation of *-ta* forms at Stage I. As (7) shows, the *-ta* participial form is attested for 80% of verb roots encoding change of state but only for 10.5% of simple verb roots. This distribution of *-ta* strengthens the case for it being associated with the resultative aspectual operator at this stage.

(7)

VERBS	CHANGE OF STATE			OTHERS
	BARE	PREVERBED	TOTAL	
Number of roots	44	10	54	38
<i>-ta</i> attested	33	10	43	4
% <i>-ta</i> forming roots	75%	100%	80%	10.5%

Second, we examined all instances of *-ta* forms for some very frequent change of state verbs in the Ṛgveda in order to determine the readings they exhibited in context. This set of verbs is given in (8). None of the predicative instances of verbs in this set exhibited the existential perfect or past perfective reading. Although the set of verbs investigated is small, the consistent absence of an existential or past eventive reading for the *-ta* forms in context supports the case for its resultative status.

(8)

verb	<i>-ta</i> form	Count	Existential/Past reading
<i>su</i> ‘press out’	<i>suta</i>	58	0
<i>yuj</i> ‘yoke’	<i>yukta</i>	46	0
<i>idh</i> ‘kindle’	<i>iddha</i>	30	0
<i>badh</i> ‘bind’	<i>baddha</i>	15	0
<i>gr̥bh</i> ‘grasp’	<i>gr̥bhīta</i>	15	0
<i>vi+tan</i> ‘spread’	<i>vitata</i>	15	0

Third, we investigated the co-occurrence of *-ta* forms with indefinite past referring and frequency adverbials. The reasoning is that if the *-ta* form can trigger eventive reference for the sentence it occurs in, then it should be possible for the predicate to be modified by indefinite past and frequency adverbs. However, this expectation is not met in the textual data. Of all occurrences of three adverbials, *purā*, *pūrvam*, and *purudhā*, only one each appear with the *-ta* form, and two of these three instances occur in the part of the text known to be authored much later than the soriginal text (the 10th Book).

(9)

Adverbial	Occurrence	modification of <i>-ta</i>
<i>purā</i> ‘of old, earlier’	45	1 (RV 6.60.4)
<i>pūrvam</i> ‘before, in the past’	8	1 (RV 10.97.1)
<i>purudhā</i> ‘often’	9	1 (RV 10.27.21)

We take these facts, together with Jamison’s quantitative study, to show that *-ta* realizes the resultative aspect at Stage I. The next section discusses the generalization of *-ta* to the perfect category in Stage II, which is the language of Late Vedic (Vedic prose).

2.2. Late Vedic: Stage II

Two changes characterize Late Vedic: (a) the availability of the existential and the universal perfect readings for *-ta* forms; and (b) the extension of *-ta* to lexical predicates which do not encode change of state.⁶ The original resultative perfect reading (ongoing result

state) is still available to *-ta*, indicating an expansion in the set of readings from Stage I to Stage II rather than a non-generalizing change.

The following examples illustrate the existential reading of *-ta*. In (10a), the verb *dr̥ś* ‘see’ does not imply a change of state. The *-ta* sentence with *dr̥ś-ta* simply makes reference to a prior seeing of the formulae (the formulae are considered divine, incapable of being written by human effort), not to any result state associated with such a seeing. This is a case where an existential reading is associated with a lexical predicate that does not encode change of state. The existential reading may also be available with lexical verbs that do encode a result state. In (10b) *smṛ* ‘teach’ can be associated with the result state of successful knowledge transfer. The context provides a description of barley (grains), which are being praised. (10b), in this context, only refers to the pronouncement on the part of the sages regarding the sin-banishing abilities of barley. There is no implication that any state has resulted from this event; the existential reading is salient. (10c) is another illustration of a *-ta* sentence with existential reading, where the form is built on the non-change-of-state predicate *vac* ‘speak’.

- (10) a. *mantrā* *nānāprakār-āḥ* *sy-ur* ***dr̥ś-tā***
 formula.NOM.PL various.sort-NOM.PL be-OPT.3.PL see-PERF.M.PL
ye *mantridarśi-bhiḥ*
 which.NOM.PL seer-INS.PL
 ‘The formulas, which have been seen by the sages, may be of various sorts.’
 (BD 1.34)
- b. *nirṇoda-ḥ* *sarvāpāpā-nām* *pavitra-m* *ṛṣi-bhiḥ*
 banishment-NOM.M.SG all.sin-GEN.M.SG filter-NOM.N.SG sage-INS.M.PL
smṛ-tam
 taught-PERF.N.SG
 ‘(You) have been taught by the sages as the filter (for) banishment of all sins.’
 (BS 3.6.5.1)
- c. *iti trayā-nām* *ete-ṣām* ***ukta-ḥ*** *sāmāsik-o*
 thus three-GEN.M.PL these-GEN.M.PL state-PERF.M.SG general-NOM.M.SG
vidhi-ḥ
 rule-NOM.M.SG
 ‘Thus, the general rule about these three (Gods) has been stated.’ (BD. 1.79)

(11) illustrates the use of *-ta* with stative predicates, where the relevant inference is that the state denoted by the lexical verb continues to hold throughout some interval from a time in the past until the reference time. The context before (11a) describes how the original father produced (*ajanayat* Imperfect) seven kinds of foods and how he apportioned (*abhājayat* Imperfect) them. One of these foods (viz. milk) he gave (*prāyacchat* Imperfect) to the animals. Since this apportioning, milk has been the basis for living and non-living beings. The *-ta* modified predicate *prati+sthā* ‘rest’ denotes the state which has held since the completion of the apportioning event.⁷ (11b) is a similar example from a later text with the verb *man* ‘think’. In this case also, the belief or thought is considered to have held throughout an interval stretching from a past time up until the present.

- (11) a. *ta-smin sarva-m pratiṣṭh-itam yat ca prāṇiti yat ca*
 it-LOC all-NOM.N.SG rest-PERF.N.SG which and live-PRES.3.SG which and
na
 NEG
 ‘On it (milk) everything has rested; that which lives and that which does not.’
 (BAU. 1.5.1)
- b. *lokasaṁgrahaṇa.artha-m hi tad amantrā-ḥ*
 world.adultery.purpose-ACC.M.SG PRT then non.mantra-NOM.F.PL
striy-o ma-tāḥ
 women-NOM.F.PL think-PERF.F.PL
 ‘It is due to their adulterous nature that women have been thought un-entitled
 to knowledge of the Vedas.’ (BS 1.5.11.7)

The final example in this section serves to illustrate the continuation of the original resultative reading available to the *-ta* form.

- (12) *saṁjñā tu viśva-m iti eṣā*
 term.NOM.F.SG PRT collective-NOM.SG thus this.FEM.SG
sarvāvāpt-au nipāt-itā
 all.comprehensiveness-LOC.SG lay.down-PERF.F.SG
 ‘The term *viśvam* (collective) has thus been laid down in (the sense of) all compre-
 hensiveness.’ (BD. 2.134)

2.3. Middle Indic: Stage III

The Middle Indic languages (illustrated here by Mahārāṣṭrī Prakrit) are characterized by a simpler past marking system, having lost most of the inflectional past tense morphology of Old Indic.⁸ The result of this morphological loss is that *-ta* becomes the default morphology for past time perfective reference (This change is, in fact, evident from the period of at least the Epic Sanskrit texts within Sanskrit (Old Indic) as well). In addition to the perfect readings of *-ta* from Late Vedic, it exhibits a past perfective reading.

Every study of Middle Indic grammar recognizes the perfective use of the *-ta* form as central to its distribution (Pischel, 1900; Bloch, 1965; Bubenik, 1996, a.o.). In addition to relying on this observation from the literature, we use two distributional diagnostics to argue that *-ta* sentences refer to culminated past events. First, in contrast to earlier periods, *-ta* is the only form available for narrating sequences of past events. In simple narrative discourse, where consecutive sentences typically move reference time forward, verbs in these sentences inflect with *-ta*. Second, in contrast to the earlier period, *-ta* appears with definite past referring adverbials. Of course, because the change involves an expansion in the set of readings, the resultative, universal, and existential perfect readings remain available to the *-ta* form.

The narrative fragment in (13) illustrates the perfective readings available to *-ta*. The main predicate in each of the sentences in (13) is a *-ta*-inflected form. The story describes the events before the sacrifice of a goat, beginning with the departure of the family (with

their friends and relatives) to the sacrificial stake. Every following sentence is understood to describe an eventuality that took place later in time, each of them ordered with respect to each other.⁹ Thus, the going (13a) is understood to occur prior to the goat-taking (13b), which is before the worshipping (13c), which is followed by the elders' announcement (13d) and the leaving of the son (13e).

- (13) a. *tato te mitta-bāndhava-sahi-ā... ga-yā*
 then they.NOM.PL friends-relatives-with-NOM.PL go-PERF.M.PL
 'Then they went there with their friends and relatives.'
- b. *chagal-o vi ya maṇḍe-um tatth-eva ni-o*
 goat-NOM.M.SG also and decorate-INF there-FOC take-PERF.M.SG
 'And the goat also was taken there to be decorated.'
- c. *gandha-puppha-malla-puyāviseseṇa ya acchi-yā*
 sandal-paste-flowers-worship-ingredients and worship-PERF.M.PL
devayā
 god-NOM.M.PL
 'The Gods were worshipped with sandalwood paste, flowers, the ingredients of worship.'
- d. *ghara-mahattara-ehi ya bhāṇi-yam chagala-o*
 house-elders-INS.PL and say-PERF.N.SG goat-NOM.SG
āṇi-jja-u
 bring-PASS-IMP.3.SG
 'And the house elders said: Let the goat be brought.'
- e. *tato tassa putt-o... chagalay-am āṇe-um ga-to*
 then his son-NOM.M/SG goat-ACC.SG bring-INF go-PERF.M.SG
 'At that, his son... went to bring the goat.' (VH:D 29.25-28)

The other piece of evidence that the *-ta* form has past eventive reference is that it may be modified by definite past adverbials. Definite time adverbials specify particular intervals within which eventualities are realized. The *-ta* form, when modified thus, indicates that a completed event obtains in the time denoted by a definite time adverbial. The impossibility of modification by definite temporal adverbials is one of the defining features of the English present perfect. The *-ta* form (which may have present reference in the absence of tense auxiliaries), on the other hand, can be freely modified in this way. In this respect it patterns like the German or French perfect, which have been analyzed as having undergone some kind of a perfect-to-perfective shift.

- (14) a. *tato kaiva-esu divas-esu aikkan-t-esu... diṭ-ṭhā me*
 then many-LOC.PL day-LOC.PL pass-PERF-LOC.PL see-PERF.F.SG I-INS
taruṇajuvati
 young.woman.NOM.SG
 'Then, upon the passing of many days, I saw the young woman.'

- b. **tamm-i ya sama-e...** *so mahis-o n-ena kiṇe-una*
 that-LOC.SG and time-LOC.SG that buffalo-NOM.M.SG he-INS.SG buy-GER
mār-io
 kill-PERF.M.SG
 ‘And, at that time, having bought that buffalo, he *killed* it.’ (VH:KH 14:21)

The following examples show that the earlier perfect readings of the *-ta* form continue to be available at this stage. (15a) illustrates the resultative reading; (15b) illustrates the existential reading, while (15c) illustrates the universal reading for *-ta*.

- (15) a. *amhe-hiṃ maṇussaḥajamma-ssa phala-m̄ sayalam̄*
 we-INS.PL human.life-GEN.SG consequence-NOM.N.SG all
gihi-yaṃ
 grasp-PERF.N.SG
 ‘We have grasped all the consequence of human existence.’ (VH:KH.5.8)
- b. *tubbhe-hiṃ mamā-o vi airitta-m̄ dukkha-m̄*
 you-INS.SG I-ABL even more-NOM.N.SG sorrow-NOM.N.SG
pa-ttam
 receive-PERF.N.SG
 ‘Have you received (experienced) even more sorrow than me (at any point in time)?’ (VH:DH.35.25)
- c. *kim mann-e devī passa-māṇī*
 why think-IMPF.1.SG lady.NOM.SG looking-PART.NOM.SG
nicchalacchī **thi-yā**
 unmoving.eyes.NOM.SG stand-PERF.F.SG
 ‘Why, I wonder, has the watching lady, stood (been standing) with an unmoving gaze?’ (VH:KH.9.7)

3. Analysis

In the previous section, we provided evidence for the instantiation of the resultative to perfect to perfective shifts in Indo-Aryan, through the changes in the interpretation of the *-ta* form from Vedic to Late Vedic to Middle Indic. In this section we characterize the meaning of the aspectual operators implicated in the analysis of predicative *-ta* forms across the three distinct stages and show how each shift involves a generalization of the meaning of the relevant aspectual operators. We are assuming that saturated clausal predications, sentence radicals, denote properties of eventualities which get instantiated by aspectual operators. Most of our assumptions are standard but we make a new proposal about the lexical denotation of change of state predicates with associated result states and the resultative perfect and about an aspectual operator whose meaning encompasses that of perfect and of perfective.

Let \mathcal{E} be a domain of eventualities, sorted into a set of events \mathcal{E}^E and a set of states \mathcal{E}^S , and \mathcal{T} a domain of non-null temporal intervals (with points as a special case) partially ordered by the relation of temporal precedence \prec and by the subinterval relation

\sqsubseteq . A function τ from \mathcal{E} to \mathcal{T} gives the time span of an eventuality. Basic eventive predicates have an eventuality argument of the sort E (event); basic stative predicates have an eventuality argument of the sort S (state). Sentence radicals arising out of such predicates then are either eventive or stative predicates. Aspectual operators, such as the perfect and the perfective that we discuss below, apply to such sentence radicals to yield predicates of times within which the properties denoted by sentence radicals are instantiated. Instantiation of properties of eventualities involves the familiar existential quantification over the Davidsonian event variable. In (16) we define instantiation for both predicates of eventualities and predicates of times.

(16) **Property Instantiation**

$$\text{INST}(P, i) = \begin{cases} \exists e \in \mathcal{E} [P(e) \wedge \tau(e) \sqsubseteq i] & \text{if } P \subseteq \mathcal{E} \\ P(i) & \text{if } P \subseteq \mathcal{T} \end{cases}$$

In the absence of overt morphosyntactic tense, we assume that a semantic tense operator, dependent on a contextually determined reference time, applies to a property of eventualities or times and instantiates it within/at that time. We use the operator TNS indexed to a time variable i whose content is given in (17). The time of utterance *Now* is always available as a potential reference time, i.e., as a value for i .

(17) Relative to context c and contextual variable assignment g_c ,

$$\text{TNS}_i = \lambda P \text{INST}(P, g_c(i))$$

We additionally define two notions that we will use in the discussion to follow: the notion of the temporal correlate $P[i]$ of a predicate of eventualities P , given in (18), and the notion of non-final instantiation, given in (19).

(18) For any $P \subseteq \mathcal{E}$, $P[i] = \lambda i \exists e [P(e) \wedge i = \tau(e)]$

(19) $\text{NFINST}(P, j, i)$ is defined only if i is a final subinterval of j
 $\text{NFINST}(P, j, i) = \exists k [\text{INST}(P, k) \wedge k \sqsubseteq j \wedge \neg(i \circ k)]$ if defined

3.1. *-ta*: Lexical Stativizer and Resultative Perfect

We take the non-ambiguity of attributive and the ambiguity of predicative *-ta* forms to show two distinct functions of *-ta*, one as a lexical, derivational operator operating on change of state verbs, the other as an aspectual operator operating on sentence radicals. The historical changes under discussion involve *-ta* as an aspectual operator. Below we briefly outline our view of *-ta* as a lexical operator and then go on to analyze its meaning as an aspectual operator.

Kratzer (2000), Piñón (1999) and von Stechow (2003), based on empirical evidence of different kinds, have made a convincing case that certain eventive verbs make result states accessible for phrasal semantic composition. Following this main idea, we assume that change of state verbs can make the result state property accessible for lexical and for phrasal semantic operations by projecting it into the lexicon in a particular way. We take verbs like *yoke* to have purely eventive denotations, such as those shown in (20), as

well as denotations that pair the eventive component with the stative component of their meaning, such as those shown in (21). We give the variants in (a) and (b) to illustrate that the descriptive term attached to the event determines the descriptive term attached to the state. For the sake of concreteness, we have chosen to associate the arguments of eventive predicates via thematic roles and the arguments of stative predicates via the ordered argument method but this is not essential to our analysis. We assume that meaning postulates regulate the identification of arguments across the two predications.

- (20) a. $\lambda y \lambda x \lambda e \text{ put-yoke-on}(e) \wedge \text{Agent}(e, x) \wedge \text{Patient}(e, y)$ [*x yokes y*]
 b. $\lambda y \lambda z \lambda x \lambda e \text{ connect-to-with-yoke}(e) \wedge \text{Agent}(e, x) \wedge \text{Patient}(e, y) \wedge \text{Theme}(e, z)$
 [*x yokes y to z*]
- (21) a. $\langle \lambda e \text{ put-yoke-on}(e), \lambda y \lambda s \text{ have-yoke-on}(s)(y) \rangle$
 b. $\langle \lambda e \text{ connect-to-with-yoke}(e), \lambda z \lambda y \lambda s \text{ connected-to-with-yoke}(s)(y)(z) \rangle$

As a lexical operator, *-ta* maps paired properties to their stative component. In that case the predicates projected to the syntax and entering semantic composition are as in (22). The eventive component of the meaning of the original predicate is not made available for semantic composition. Any implications about the existence of an event of the relevant type resulting in the truth of the stative predication are inferential.

- (22) a. $\lambda y \lambda s \text{ have-yoke-on}(s)(y)$
 b. $\lambda z \lambda y \lambda s \text{ connected-to-with-yoke}(s)(y)(z)$

Pairs such as those in (21) are also projected to the syntax and enter semantic composition, where the arguments of the stative predicate will be saturated. The output will be paired eventive-stative property sentence radicals. *-ta* in its function as an aspectual operator applies to such sentence radicals to yield the temporal correlate of the stative property. We can thus identify the meaning of *-ta* with the aspectual operator RESPERF.

The resultative perfect RESPERF applies to paired property sentence radicals and instantiates the two properties via paired property instantiation, defined in (25). The logical form of sentences with a sentence radical $\langle P, Q \rangle$ would be as in (23). The reference time r specified by tense has to be one of the elements of $\text{RESPERF}(\langle P, Q \rangle)$. Given that $r \in \text{RESPERF}(\langle P, Q \rangle)$ only if $r \in Q[i]$, the characteristic entailment of the resultative perfect that the reference time is included in the time span of the result state is captured.

$$(23) \text{ TNS}_i(\text{RESPERF}(\langle P, Q \rangle))$$

$$(24) \text{ RESPERF} = \lambda R \lambda i \text{ INST}^2(R, i) \text{ defined only if } R = \langle P, Q \rangle \text{ with } P \subset \mathcal{E}^E \text{ and } Q \subset \mathcal{E}^S.$$

(25) **Paired Predicate Instantiation**

$$\text{INST}^2(\langle P, Q \rangle, i) = \exists e \in \mathcal{E}^E \exists s \in \mathcal{E}^S [P(e) \wedge Q(s) \wedge \text{result}(e, s) \wedge i = \tau(s)]$$

We assume that for any event e and state s if $\text{result}(e, s)$, then $\tau(e) \prec \tau(s)$, and allow for multiple states, with different time spans, to be related to an event e via result , i.e., unlike many other treatments of the resultative perfect we do not take result to be functional

and thus avoid having to refer to maximal states. Otherwise, we remain agnostic here on how exactly result should be axiomatized, for instance, whether it involves the notion of causation.

To illustrate, let us consider a somewhat simplified resultative perfect variant of the Vedic (6a), rendered in English as in (26). Its sentence radical would be as in (27), and application of RESPERF would yield (28). Application of tense to (28) with the reference time set to Now would yield (29).

(26) The dolphin has been yoked to the chariot.

(27) $\langle \lambda e \text{ connect-to-with-yoke}(e), \lambda s \text{ connected-to-with-yoke}(s)(d)(c) \rangle$

(28) $\lambda i \exists e \in \mathcal{E}^E \exists s \in \mathcal{E}^S [\text{connect-to-with-yoke}(e) \wedge \text{connected-to-with-yoke}(s)(d)(c) \wedge \text{result}(e, s) \wedge i = \tau(s)]$

(29) $\exists e \in \mathcal{E}^E \exists s \in \mathcal{E}^S [\text{connect-to-with-yoke}(e) \wedge \text{connected-to-with-yoke}(s)(d)(c) \wedge \text{result}(e, s) \wedge \text{Now} = \tau(s)]$

3.2. From Resultative Perfect to Perfect

For any pair $\langle P, Q \rangle$ and any $i \in \text{RESPERF}(\langle P, Q \rangle)$, there is an interval j of which i is a final subinterval such that j contains an event e of type P which does not overlap i . In other words, the subset relation in (30) holds for the following two sets of times: the set of times in the temporal correlate of Q and the set of times that are final subintervals of intervals within which P is instantiated non-finally.

(30) $\lambda i \text{INST}^2(\langle P, Q \rangle, i) \subseteq \lambda i \exists j \text{NFINST}(P, j, i)$

We claim that this entailment of the resultative perfect gets conventionalized as the meaning of *-ta*, when it combines with verbs of any kind without restrictions. In Stage II then, *-ta* is identified with the aspectual operator RESPERF applying to paired property sentence radicals, as in Stage I, and also with the aspectual operator PERF applying to sentence radicals of the regular type. The meaning of PERF is given in (31).

(31) $\text{PERF} = \lambda P \lambda i \exists j [i \sqsubseteq_{\text{final}} j \wedge \text{NFINST}(P, j, i)]$

This is, in effect, the ‘extended now’ analysis of the perfect (McCoard, 1978; Dowty, 1979; Iatridou et al., 2001, among others). If P is an eventive or stative sentence radical and the reference time is the time of utterance, the meaning of the sentence would be as in (32): P is asserted to be instantiated within intervals preceding Now.

(32) $(\text{PERF}(P))(\text{Now}) = \exists j \exists k \exists e [P(e) \wedge \neg(\text{Now} \circ k) \wedge \tau(e) \sqsubseteq k \wedge k \sqsubset j \wedge \text{Now} \sqsubseteq_{\text{final}} j]$

The existential and universal readings are a consequence of the semantic properties of the predicate P to which PERF applies; these determine certain relations between elements of P and elements of $\text{PERF}(P)$. To show how the existential and the universal readings arise we will consider here only PERF applying to eventive and stative sentence

radicals, though the same point can be made for temporal properties as well. Take an eventive predicate P . For any $t \in P[i]$, there is a subset $Sub_t(\text{PERF}(P))$ of $\text{PERF}(P)$ such that for every $t' \in Sub_t(\text{PERF}(P))$, $t \prec t'$. For any such P , $\text{PERF}(P)$ will yield the existential reading, involving backshifting from the reference time. Take a stative predicate P that holds over a given time. Given the divisiveness of stative predicates and their temporal correlates,¹⁰ there are $t \in P[i]$ and subsets $Sub_t(\text{PERF}(P))$ of $\text{PERF}(P)$ such that for every $t' \in Sub_t(\text{PERF}(P))$ the convex interval $[t, t']$ ¹¹ is itself an element of $P[i]$. If the reference time r is assumed to be within such a subset of $\text{PERF}(P)$, then the universal reading arises. Otherwise, the existential reading arises.

3.3. From Perfect to Perfective

In the transition from Stage II to Stage III the condition for non-final instantiation is generalized to instantiation and *-ta* is identified with the aspectual operator PERV, whose meaning is given in (33).

$$(33) \text{ PERV} = \lambda P \lambda i \exists j [i \sqsubseteq_{\text{final}} j \wedge \text{INST}(P, j)]$$

PERV subsumes the readings of PERF and in addition allows for instantiation within the reference time, the hallmark of a perfective reading. If $i = j$ or if $i \sqsubseteq_{\text{final}} j$ and P is instantiated within i , the perfective reading arises. If P is instantiated before i within j , the perfect reading arises. In case P is instantiated at some time within j that overlaps i , the eventuality instantiating P is taken to be culminating within i , hence within the reference time.

In this paper we do not work out the dynamics of reference time advancement but we can assume that in a narrative sequence like that of (13) each sentence is evaluated relative to the reference time set by the context thus far and then resets the reference time to a later time. That reference time is then given as an argument to the temporal abstract obtained by applying PERV to the sentence radical of the following sentence, with i and j identified.¹²

4. Comparisons and conclusion

We have characterized the meanings of *-ta* as an aspectual operator at the three diachronic stages and demonstrated the semantic relatedness of resultative (RESPERF), perfect (PERF), and perfect+perfective (PERV). *-ta* undergoes successive generalization of its meaning. Our proposal rests on the conventionalization of entailed meaning and the generalization of the relation instantiating event descriptions in time. It, therefore, holds promise of application to other instances of this type of cross-linguistic shift.

4.1. Semantic generalization vs. invited inferences

Our semantically-rooted account may be contrasted with the pragmatic inferencing approach that has been invoked for explaining regular semantic change (Traugott and Dasher,

2002; Eckardt, 2006). On this view, pragmatically derived ‘invited’ inferences associated with an expression are diachronically *semanticized* or conventionalized as part of the meaning of that expression. For instance, Eckardt (2006) proposes that the emergence of the prospective aspect in English is the result of the conventionalization of the invited inference of imminent event occurrence available to a transparent *going to V* construction. The conventionalized meaning is distinct from the original compositionally available meaning and the form may be ambiguous between the diachronically former and latter meanings at some stage.

The pragmatic inferencing hypothesis and the meaning generalization hypothesis make distinct predictions about the meanings of the aspectual categories concerned. Specifically, it is only the latter that requires that the meaning of an expression at a diachronically earlier stage be a subset of the meaning at a later stage. In this regard, the semantic generalization hypothesis offers a more restrictive account of the set of changes in question.

4.2. *Motivating semantic generalization*

Our account may explain how the diachronic changes involve semantic generalization, but it does not address the motivating factors for the occurrence of each shift. Here we offer some speculative remarks on why the shifts might have occurred. The Old Indo-Aryan finite verbal tense-aspect system (Stage I) contains a number of past aspectual categories, which overlap with *-ta* in some of their uses. The Aorist expresses the perfective, while the reduplicated Perfect realizes the more general perfect aspect, with stative present readings limited to some predicates. The Imperfect is a neutral past tense, and is often used in narrative contexts with eventive reading (Delbrück, 1888; Whitney, 1892). In the second stage, the reduplicated perfect generalizes to include the past perfective reading, overlapping in this domain with the Aorist and the Imperfect. By the time of Epic Sanskrit these three past referring categories have become interchangeable and there is an increase in the frequency of the *-ta* form.¹³ These three finite categories are lost almost entirely by Stage III (Pischel, 1900) and their functions taken over by the *-ta* form. At Stage III, *-ta* realizes the complex aspectual category PERV (perfect+perfective) and has the entire range of readings available to the older, lost Perfect and Aorist.

A plausible motivation for the generalization of *-ta* is the diachronic loss of forms that express perfect and perfective meaning, respectively. The semantic shift, thus, may be seen as going hand-in-hand with a morphological change that affects the semantic categories expressed by the broader verbal paradigm of Indo-Aryan. We do not have spontaneous changes in the meaning of *-ta* but rather these changes are triggered by the need for morphology that can express the semantic categories previously expressed by older forms. This change is, of course, spread over several centuries and must have involved a period over which *-ta* increased in relative frequency over the Perfect and the Aorist. There is a clear morphological advantage that *-ta* enjoys over the Perfect and the Aorist: it is built on the root, and constructs an invariant stem that inflects with the set of adjectival endings. The Perfect and Aorist stems involve reduplication and other morphological changes to the root, and the perfect further involves a distinct set of personal endings. The case can be made that the increasing use of *-ta* is facilitated by its relative lack of morphological complexity and predictable derivation, but that remains a speculative point, and is

ultimately orthogonal to the purposes of this paper.

4.3. Conclusion

Our semantic analysis shows that the resultative to perfect to perfective shift is a generalization, which is consistent with the proposal that grammaticalization is non-exemplar-based analogical change (as has been argued by Kiparsky, 2005). A more ambitious goal would be to specify the factors that trigger the grammaticalization in a particular language at a particular time. We suggested some language-specific factors that might have triggered it in Middle Indic. Our proposal makes predictions that can be tested by textual research that traces changing the frequencies of *-ta* and its competitors across time.

5. Notes

1. These are approximate periods and the first of these, especially, only gives the broad window within which Northern and North-west India were settled (Jamison and Witzel, 1992, p.6). The composition of the texts that have been used for our research, for the most part, took place in the later parts of each of the three delineated chronological stages.
2. For a recent discussion of the descriptive issues and analytical choices pertaining to the syntax and semantics of the perfect see Alexiadou et al. 2003.
3. The Modern Greek cognate of *-ta*, the participle in *-tos/ti/to*, exhibits only the plain stative reading and contrasts with *-menos/meni/meno* participles which exhibit the result stative reading. For discussion and other references see Anagnostopoulou 2003.
4. We gloss *-ta* as PERF regardless of its distribution and readings at distinct stages of Indo-Aryan. The other glosses are as follows: PRES = present; PST = past; IMP = imperative; NOM = nominative; ACC = accusative; INS = instrumental; GEN = genitive; LOC = locative; M = masculine; F = feminine; N = neuter; SG = singular PL = plural; PRT = particle; FOC = focus particle.
5. The information for the first attested *-ta* forms for lexical roots and the roots themselves have been gleaned from Grassman, 1964 and Whitney, 1883.
6. It is difficult to precisely locate a line of clean separation between Stage I and Stage II corresponding to Vedic verse and Vedic prose. Specifically, there is no exhaustive study of Vedic lexical verbs that establishes that *-ta* appears only with change of state predicates in Early Vedic (Stage I), although, overwhelmingly *-ta* is used to describe result states. Early Vedic texts (the Mantras) were composed over a long period and represent multiple linguistic layers. What we are able to clearly show in this section is that Stage III (the period characterized by Middle Indic (and possibly Epic and Classical Sanskrit) is preceded by a period during which *-ta* functions as the perfect with existential, universal, and resultative readings. At this stage, covering the bulk of the Vedic prose, “the tendency is to assimilate the part.(iciple) to the present” (Keith 1909: 248). This tendency is much more visible in the *Dharmasūtras*, the youngest texts within Vedic prose.
7. Note that the universal reading of the perfect is absent in several languages, such as Greek and Russian. In these languages, the universal reading is expressed by the present tense forms. *-ta* forms with stative predicates occurring in Vedic prose may often be translated in the English present tense (e.g., Keith, 1909). However, the fact that this translation is possible with a form expressing resultative or perfect meaning provides evidence that the form licenses universal perfect readings.
8. The inflectional system of verbal contrasts in OI changed to a relatively morphologically impoverished inflectional system in MI with loss of most of the past referring categories. Pischel (1900), on the basis of careful textual study, reports that the Imperfect, the Aorist, and the Perfect occur in MI texts only as a few scattered forms for a few verbs. The single instance of the Imperfect retained in MI is the Imperfect form of the verb *as* ‘be’ (Pischel, 1900: 421-22). The Aorist occurs relatively more frequently (Pischel, 1900: 422-24), while the Perfect is preserved only as an archaism for a few verbs. Bloch (1965: 228-233) reaches the same conclusion. The only remaining past-referring paradigm from Epic Sanskrit is

the PERF paradigm and it is used regularly for past time reference, which is the reason for it to be considered the simple past tense in MI.

9. Also see VH:KH 3.10-17, VH:KH 7.7-11, VH:KH 23.8-12, Vh:D 29.19-23, VH:D. 31. 1-8, VH:D. 34. 18-25 as examples in support of the claims that *-ta* forms have eventive reference and are understood as causing an advancement of reference time.
10. A temporal predicate *P* is divisive iff its denotation is closed under the subinterval relation.
11. $[t, t']$ is a convex interval with *t* as an initial subinterval and *t'* as a final subinterval.
12. In this version of the paper we use temporal adverbs as diagnostics for certain readings but we do not provide an analysis of them.
13. While this lack of distinction has been well-established in the literature, it is a puzzle why the Imperfect, the Aorist, and the Perfect are interchangeable at the Epic Sanskrit stage. It is conceivable that the writers of the Sanskrit Epics, are, in fact, speakers of a language with a Middle Indic (Stage III) type system, characterized by a single perfective form and no further distinctions within the perfective domain. We know that the MI Prakrits were the vernacular languages in the region at least since the 300 BCE (based on Aśokan inscriptions). On the other hand, Sanskrit was the learned language of prestige. MI native speakers, whose language was characterized by a single aspectual category that referred to past situations—the *-ta* form—may well have mapped the distinct Vedic paradigms onto this single category, when writing in Sanskrit. This can account for why the three paradigms appear to be undifferentiated in terms of their distribution. It also accounts for the increased frequency in the usage of *-ta* (Avery, 1875), an anticipation of the later MI system, where this is the only exponent of the perfective and perfect aspects.

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