Proceedings of SALT 32: 599–618, 2022

Back to restitutive readings again*

Jyoti Iyer
University of Massachusetts Amherst

Abstract This paper observes that adverbs meaning 'back' systematically give rise to restitutive readings which have long been thought of only as secondary readings of adverbs meaning 'again'. Restitutive readings are argued to arise from two sources: repetition of a state, or reversal of an event. Languages like English and Hindi-Urdu have a separate dedicated adverb for each, showing the independence of these two sources. A single reversal-based/counterdirectional lexical entry (originally proposed for AGAIN) is demonstrated to capture an intuitive relationship that exists between three core readings of BACK. These readings are, however, shown to have several as yet unconsidered properties that necessitate a finer-grained expression of counterdirectionality than is afforded by the broad concept of reverse events. The paper significantly revises the counterdirectional presupposition, capturing the core readings of BACK-adverbs by appealing not to repetition or reversal but to elements that can be copied from the assertion itself: THEME, SCALE, and end point of scalar change.

Keywords: adverb, presupposition, restitutive, counterdirectionality, again, back, scalar, Hindi-Urdu

1 Introduction

English adverbs *again* and *back* are interchangeable in *restitutive* contexts, i.e. contexts which convey a state being restored. This paper explains how adverbs like *back*, which lack a repetitive interpretation, can yield the same restitutive readings as repetitive adverbs like *again*; in both (1a) and (1b), the state of the lid being open is being restored.

(1) a. Anu closed the lid, and then popped it open **again**.
b. Anu closed the lid, and then popped it **back** open.

This interchangeability is not limited to English, but is rather characteristic of presuppositional adverbs meaning 'again' and 'back' in various languages. The equivalent AGAIN and BACK adverbs in Hindi-Urdu are shown in (2):

* I thank Rajesh Bhatt and Kyle Johnson for comments on my related dissertation chapter, and an anonymous SALT reviewer for valuable inputs on the domain of scalar change.

©2022 Iyer

(2) anu-ne Dhakkan {**phir-se / vaapas**} khol diyaa.
Anu-ERG lid {AGAIN / BACK} open GIVE.PFV
Lit. 'Anu opened the lid again/back.'

Research into restitutive readings has historically centered around AGAIN-adverbs, in particular German *wieder* and English *again*, leading to a now-standard STRUCTURAL ACCOUNT of restitutive readings as arising from an attachment ambiguity in predicates that syntactically decompose into a causing event and a result state. Two events in the syntax mean two VP attachment sites for the adverb. Restitutive readings are produced by AGAIN attaching low, with only the result state its scope, and introducing a correspondingly low repetitive presupposition as in (3).

(3) *Restitutive/Low repetitive presupposition*
There exists a prior state of the lid being open.

An alternative explanation that has recently received renewed attention is the LEXICAL ACCOUNT that proposes that the interpretive effect of state-restoring arises from a second lexical entry that introduces a rather different sort of presupposition:

(4) *Counterdirectional presupposition*
There exists a prior event that is the reverse of the lid being opened.

This paper shows that although the counterdirectional presupposition was conceived of in the context of restitutive readings, it captures the essence of a range of meanings expressed by adverbs like English *back*. Languages like English and Hindi-Urdu that exhibit two *distinct* adverbs—one for repetition/AGAIN and another for counterdirectionality/BACK—provide evidence for counterdirectionality as an empirically attested *independent* source of restitutive readings.

The paper further shows that the RESTITUTIVE and REVERSED PATH readings of BACK share a set of properties that are mysterious under the general notion of reversal in Patel-Grosz & Beck 2014, 2019, and call for a finer-grained statement of what constitutes the reverse of any given event. I account for these properties with a revised counterdirectional presupposition modelled on Zwarts 2019.

(5) *Revised counterdirectional presupposition*
There exists a prior event of an entity undergoing scalar change, where both entity and scale are the same as in the assertion, and the end point of the change is the start point of the asserted event.

In the sections to follow, I present the theoretical background and empirical landscape, and outline the properties that make up the desiderata for a semantics of BACK-adverbs. I then propose a semantic analysis which captures the outlined properties, and yields the effect of a restitutive reading without appealing to either repetition or reversal.

2 Background

Restitutive readings have largely been studied as a secondary reading of AGAIN; therefore I begin with a summary of treatments of AGAIN that capture this reading.

2.1 Restitutive readings with AGAIN

The first (and more widely accepted) of the two approaches to restitutive readings in the literature (Stechow 1995, 1996; Beck & Johnson 2004 among others), is the STRUCTURAL ACCOUNT, which posits a single lexical entry for AGAIN that contributes a *repetitive presupposition* as shown in (6).

(6) *Repetitive presupposition*
There exists a prior event that is the same as the asserted event.

The AGAIN-adverb is a modifier of properties of events; it adjoins to a VP projection. Where the event can be syntactically decomposed into a higher causing subevent, and a low caused subevent, there are two eventualities that the adverb may modify. Restitutive readings constitute that subset of uses of AGAIN where the adverb attaches low enough in the structure to include in its scope only the result state-denoting subevent, and not the higher causing subevent. The presupposition introduced by the adverb differs in its content depending on whether it attaches at a higher or a lower position; the two possibilities for (1a) (repeated as 7a) are below:

(7) a. Anu popped the lid open **again**. [=(1a)]
b. *Repetitive presupposition*
i. *High/eventive:* There exists a prior event of Anu popping the lid open.
ii. *Low/stative (restitutive):* There exists a prior state of the lid being open.

Formally, the meaning of AGAIN is expressed as in (8). The adverb adjoins to a projection of type $\langle vt \rangle$, where v is the semantic type for events (and states). The contribution of the adverb is wholly presuppositional: the semantic value of the VP passes up unchanged. The presupposition is shown between a colon and a period.

(8) $[\![\text{AGAIN}]\!]_{\langle\langle vt\rangle\langle vt\rangle\rangle} = \lambda P_{\langle vt\rangle}.\lambda e_v\colon \exists e'_v\ [e' \prec e \wedge P(e')].\ P(e)$

The second approach (Fabricius-Hansen 1983, 2001) is the LEXICAL ACCOUNT, which posits two distinct lexical entries for AGAIN-adverbs. While the repetitive reading is handled by the same denotation as (8) above, the restitutive reading is captured using a second lexical entry, counterdirectional AGAIN_C as in (9).

(9) $[\![\text{AGAIN}_C]\!]_{\langle\langle vt\rangle\langle vt\rangle\rangle} = \lambda P_{\langle vt\rangle}.\lambda e_v.\ \exists e'_v\ [e' \prec e \wedge P_C(e')].\ P(e)$
where P_C is the reverse of P

For our example sentence (1a), this presupposition can be expressed as follows:

(10) a. Anu popped the lid open **again**. [=(1a)]

b. *Counterdirectional presupposition*
There exists a prior event that is the reverse of Anu popping the lid open.

Unlike the STRUCTURAL account, the LEXICAL account does not appeal to the presence of result states. Rather, in this analysis, result states are incidental: counterdirectionality is a relationship that can exist between events with or without a result state, so long as the presupposition in (9) is satisfied.[1] The events which happen to have result states are identified as yielding restitutive readings.

The availability of the two above analyses for a single reading reflects a fact about how states function in the real world. If an object starts out in the state s, it can be restored to state s if and only if there is an intervening period (however small) where the object is in the state $\neg s$ (Fabricius-Hansen 2001). A sequence of $s \prec \neg s \prec s$ is shown below:

(11) *Context that licenses* (1a)/(10a): *The lid started out open.* **Anu closed it**. Then she realized she wanted to get something from the container, so she opened it once more. So the lid ended up open.

a. *Counterdirectional presupposition*
There exists a prior event that is the reverse of Anu popping the lid open.
$\Rightarrow$ *satisfied by bolded portion*

b. *Restitutive/Low repetitive presupposition*
There exists a prior state of the lid being open.
$\Rightarrow$ *satisfied by italicized portion*

As shown above, the same context is consistent with both presuppositions, and therefore compatible with both analyses. Recent literature has argued that indeed both analyses may be present in a single language. I turn to these arguments next.

2.2 Restitutive readings with BACK

The counterdirectional presupposition for AGAIN-adverbs captures precisely the kind of relationship between events that is expressed by BACK-adverbs.

(12) *Counterdirectional presupposition*
There exists a prior event that is the reverse of the asserted event.

The LEXICAL account is indifferent to the result states; the above presupposition represents the meaning common to the three uses of BACK-adverbs shown for

1 This is the position taken by Patel-Grosz & Beck (2014, 2019), not necessarily by Fabricius-Hansen.

English in (13). While (13b) has an adjectival result state familiar from canonical restitutive readings of AGAIN, (13a) has a PP-result, and (13c) no result at all.

(13) *English*

a. Ali flew **back** from New York. REVERSED PATH

b. The door swung **back** open. RESTITUTIVE

c. Bina hugged Ali **back**. RESPONSE

In each of the above sentences, *back* introduces a presupposition of an earlier reverse event as in (12): Ali flew *to* New York earlier, the door swung *shut* earlier, and *Ali* hugged *Bina* earlier. English thus provides evidence for the following reframing of the counterdirectional lexical entry to apply to BACK (adapted from Patel-Grosz & Beck 2014, 2019):

(14) $[\![\text{BACK}]\!]_{\langle\langle vt\rangle\langle vt\rangle\rangle} = \lambda P_{\langle vt\rangle}.\lambda e_v.\ \exists e'_v\ [e' \prec e \wedge P_C(e')].\ P(e)$
where P_C is the reverse of P

This reframing represents the intuition that BACK-adverbs uniformly introduce a presupposition of a prior reverse event. In case the assertion includes a result state, the interpretation produced is the same as a restitutive reading with AGAIN.

2.3 Looking ahead

A shortcoming of Patel-Grosz & Beck's lexical entry in (14) above is that it does not provide a generally-applicable method for determining the value of P_C: for every sentence containing BACK, context determines case-by-case what propositions may count as the reverse of the prejacent.[2] In the following sections I show that there exist some as yet unconsidered properties of reverse events which generally hold across the uses of BACK, and would be missed by using P_C alone. A preview is shown below. While it seems commonsensical that the reverse of Ada cycling *from* somewhere *to* school is Ada cyling *to* somewhere *from* school (15a), even minimal variations complicate the picture. A semantics for BACK must be able to explain why, for example, (15b) constitutes an acceptable reversal, but (15c) does not.

(15) a. Ada cycled to school. After a while, **she cycled back**.

b. Ada cycled to school. After a while, **she walked back**.

c. Ada cycled to school. After a while, **#Boris cycled back**.

2 Patel-Grosz & Beck (2019) present a method based on F-marking, Givenness, and word-order that works in Kutchi Gujarati but does not readily extend to languages with other word-order patterns; in my dissertation (Iyer forthcoming) I demonstrate its inapplicability to Hindi-Urdu.

The above preview already suggests that we need to be able to *look inside* P_C to distinguish different parts of the event description. A redefinition of the above lexical entry by Zwarts (2019) covers some ground towards this goal by including an explicit PATH component. Rather than stipulating a new category of reverse events as a primitive, Zwarts 2019 appeals to the existing category of paths, which are directed, and thus easily reversible.

(16) $[\![\text{BACK}]\!]_{\langle\langle vt\rangle\langle vt\rangle\rangle}$ (Zwarts 2019)
$= \lambda P_{\langle v,t\rangle}.\lambda e_v : \exists e'_v[e' \prec e \wedge P'(e') \wedge \text{REVERSE}(\text{PATH}(e), \text{PATH}(e'))].P(e)$
where P' is a free variable that specifies what is already in the common ground concerning e', apart from its being earlier and opposite in direction

2.4 Typological landscape

The three core readings shared by the BACK-adverb in all four languages discussed here, i.e. English, Hindi-Urdu, Dutch (Zwarts 2019), and Kutchi Gujarati (Patel-Grosz & Beck 2014, 2019) are illustrated in (17) below using English sentences.

(17) *English*

a. Ali flew **back** from New York. REVERSED PATH

b. The door swung **back** open. RESTITUTIVE

c. Bina hugged Ali **back**. RESPONSE

The REVERSED PATH reading conveys motion that restores an entity to its previous location, and arises when the BACK-adverb occurs with a verb of directed motion. The RESTITUTIVE reading, familiar from the literature on AGAIN, conveys an entity being restored to a state it previously held, and arises with verbs of result. The RESPONSE reading stands apart from the other two readings in that it does not involve restoring at all, but rather conveys deliberate, communicative actions. This reading frequently arises with verbs of communication like *to yell*, *to call* but may involve any action that is intended or contextually understood as a response to a prior action. Detailed discussion in this paper is focused on the first two readings for reasons of space, but I offer brief comments on RESPONSE readings in the conclusion section. Examples below show the three core readings as they occur in Hindi-Urdu.

(18) *Hindi-Urdu*

a. ali **vaapas** bhaag rahaa hai.
Ali back run PROG be.PRS
'Ali is running back.' REVERSED PATH

b. kamraa **vaapas** saaf ho rahaa hai.
room back clean be PROG be.PRES
'The room is getting clean(ed) again.' RESTITUTIVE

c. ham bhii **vaapas** golii calaa dẽge.
1PRON.PL also back bullet WALK.CAUS GIVE.SUBJ
'We will also shoot back.' RESPONSE

The same three core readings are found in Kutchi Gujarati (KG), shown in (19), and in Dutch, shown in (20), but these languages depart in a specific way from the Hindi-Urdu/English-type, which I discuss below.

(19) *Kutchi Gujarati* (Patel-Grosz & Beck 2019)

a. John park-ma ato g-y-o pache John **pach-o**
John park-in walk for go-PFV-M.SG then John
park-ma thi aav-y-o.
AGAIN/BACK-M.SG park-in from come-PFV-M.SG
'John walked into the park.
Then John came back out of the park.' REVERSED PATH

b. Reena **pach-o** dharvajo kol-y-o.
Reena AGAIN/BACK-M.SG door open-PFV-M.SG
'Reena opened the door again.' RESTITUTIVE

c. John Bill-ne chikru soda-thi chant-y-u Bill
John Bill-ACC sticky soda-with spray-PFV-N.SG Bill
pach-o John-ne chant-y-o chikru soda-thi.
AGAIN/BACK-M.SG John-ACC spray-PFV-M.SG sticky soda-with
'John sprayed Bill with the sticky soda.
Bill sprayed John back with the same sticky soda.' RESPONSE

(20) *Dutch* (Zwarts 2019)

a. De feestgangers liepen **terug** (naar de tent).
the partygoers walked terug (to the tent)
'The partygoers walked back (to the tent).' REVERSED PATH

b. Hij heeft **terug** een job.
he has terug a job
'He has a job again.' RESTITUTIVE

c. Toen hij werd uitgescholden, schold hij niet **terug**.
when he was reviled, reviled he not terug
'When he was reviled, he did not revile in return.' RESPONSE

Dutch *terug* and Kutchi Gujarati *pacho*, in addition to the three readings highlighted above, also convey repetitive meaning, as shown in the following examples.[3] In (21a), the event of the team winning is repeated, and in (21b), the event of dancing is repeated. By contrast, in both English and Hindi-Urdu, the lexical item that has the three readings identified for BACK-adverbs does not have the additional repetitive reading. Example (21c) shows that *vaapas*/*back* are unacceptable in a repetitive situation where the AGAIN-adverb is acceptable. Indeed, even in the English translations of examples (21a) and (21b), we see the word 'again' since 'back' would be unacceptable in the metalanguage.

(21) *Repetitive reading available in Dutch/Kutchi Gujarati, not Hindi-Urdu/English*

a. Onze school heeft **terug** de beker gewonnen.
our school has terug the cup won
'Our school has won the cup again.' *Dutch*, (Zwarts 2019)

b. Valji **pach-o** nach-y-o.
Valji again-M.SG dance-PFV-M.SG
'Valji danced again.' *KG*, (Patel-Grosz & Beck 2019)

c. Valji {phir-se / ***vaapas**} nachaa.
Valji {AGAIN / *BACK} dance-PFV
'Valji danced again/*back.' *Hindi-Urdu/English*

	Repetitive (*repeat event*)	*Counterdirectional* (REVPATH+REST+RESP)	*Restitutive* (*repeat state*)
Type I: Overlap			
English	*again*	*back*	*again*, *back*
Hindi-Urdu	*phir-se*	*vaapas*	*phir-se*, *vaapas*
Type II: Merger			
Dutch	*terug*	*terug*	*terug*
Kutchi Gujarati	*pacho*	*pacho*	*pacho*

Table 1 A typology of AGAIN/BACK.

The empirical landscape sketched here includes two distinct types of languages, as shown in Table 1. The first column lists the lexical items employed to introduce the repetitive presupposition (which I refer to as AGAIN-adverbs in this paper for convenience), and the second column the lexical items for the counterdirectional

3 The Dutch data I cite here reflect a productive paradigm in Belgian Dutch; see Zwarts 2019 for differences between Belgian and Netherlandic Dutch in the readings attested for *terug*.

presupposition (i.e. BACK-adverbs with the three core readings discussed above). *Type I* languages have two distinct lexical items, whereas *Type II* have a single lexical item used in the first and second columns, exhibiting a radical merger between the two meanings. Unsurprisingly, the same lexical item is used in restitutive readings as well. To return to the observation made in the introduction, the third column shows the interchangeability of the two distinct lexical items in *Type I* languages.

The three core readings of BACK correspond to three distinct categories of predicates, and form a systematic paradigm that is stable across languages. The following section outlines the properties that unite the three readings, with a particular focus on REVERSED PATH and RESTITUTIVE readings.

3 Desiderata for a semantics of BACK

The various uses of BACK exhibit some key properties that previous analyses have not accounted for. We will see in this section that the data demand a counterdirectional presupposition that is more fine-grained than has previously been assumed.

3.1 Directions of scalar change

The REVERSED PATH and RESTITUTIVE examples in (22b) and (22a) seem to have very similar interpretations. In this section I present a way to unite them under a single umbrella of scalar change.

(22) *English*

a. Ali flew **back** from New York. REVERSED PATH

b. The door swung **back** open. RESTITUTIVE

c. Bina hugged Ali **back**. RESPONSE

Intuitively, for an asserted event of flying by Ali *from* New York (to place X), a reverse event might be a flying by Ali *to* New York (from place X).

(23) Ali flew back from New York.
$\Rightarrow$ defined iff $\exists$ *prior event which is the reverse of Ali flying from New York*

A similar intuition obtains for motion events in general: that for any motion event, its reverse is some event in which the moving entity traverses the reverse spatial path. It is the fact of movement that is relevant here, not the grammatical role or animacy of the moving entity; as (24) shows, back can convey the traversal of a reverse path by any entity. The examples in (24) further show that parts of the path of motion—Source and Goal—need not be specified overtly.

(24) a. i. Ali flew back from New York. *only Source*
...and earlier he had flown to New York

ii. Ali flew the documents back to Delhi. *only Goal*
...and earlier the documents had been brought from Delhi

b. Lassie {came/was brought} back. *neither*
...and earlier she had left (the place she came back to)

Thus, for REVERSED PATH readings we can form a generalization about what constitutes $P_C(e)$, given some $P(e)$:

(25) GENERALIZATION 1A: BACK refers to two directed motion events with reverse spatial paths.

When we look at events of change of state, we find a parallel pattern—for an asserted event of swinging-open by the door, an easily-imagined reverse event is a swinging-shut by the door. For any change-of-state event, its reverse belongs to the set of events in which the entity undergoes a change in the reverse direction.

(26) The door swung back open.
$\Rightarrow$ defined iff $\exists$ *prior event which is the reverse of the door swinging open.*

In (27) below, we see that a list similar to (24) above can be created for change of state as well, allowing us to form another generalization as shown in (28)

(27) a. Ada switched the tv back on. *only end state*
...and earlier the tv had been turned off

b. Sonam shook me back out of a stupor. *only start state*
...and earlier I had gone into a stupor

c. Fairy godmothers turn frogs back into princes. *both*
...and earlier the princes had become frogs

(28) GENERALIZATION 1B: BACK refers to two change-of-state events with reverse directions of change.

The family resemblance of GENERALIZATION 1A and 1B is no coincidence: directed motion verbs and change-of-state verbs are well-known to be semantically structured in parallel ways, each with an identifiable *stative scalar attribute* serving as the semantic core of the verb. Events in the denotation of the verb involve a change in the value of that scalar attribute (Rappaport Hovav 2014). The examples above show for both REVERSED PATH and RESTITUTIVE readings, there is a general pattern to what constitutes $P_C(e)$, given some $P(e)$:

(29) GENERALIZATION 1: BACK refers to two events with reverse directions of scalar change.

We now have the first ingredient for an explanation of why a BACK-adverb can give rise to a restitutive reading. The adverb selects for events that contain scalar change, which may be spatial or non-spatial in nature. The cases of non-spatial scale correspond to the meaning conventionally referred to as restitutive.[4]

3.2 The independence of the predicate

Let's consider events with reverse directions of change in terms of recoverability from context. The null hypothesis for ease of recoverabilty is that *other than the path* (which is reversed), other properties of the presupposed event are the same as the properties of the asserted event, as shown in (30). In terms of Zwarts's lexical entry in (31), the value of P' can simply be copied from P (modulo reversed path).

(30) Null hypothesis: The presupposition triggered by BACK is *there exists a prior event of the same kind with a reverse path.*

(31) $[\![\text{BACK}]\!]_{\langle\langle vt\rangle\langle vt\rangle\rangle}$ (Zwarts 2019)
$= \lambda P_{\langle v,t\rangle}.\lambda e_v : \exists e'_v[e' \prec e \wedge P'(e') \wedge \text{REVERSE}(\text{PATH}(e), \text{PATH}(e'))].P(e)$
where P' is a free variable that specifies what is already in the common ground concerning e', apart from its being earlier and opposite in direction

According to our null hypothesis, the reverse of Ali flying or the door swinging along a path p is Ali flying or the door swinging along path p' such that the following statement holds: $\text{REVERSE}(p, p')$. To be more precise, the counterdirectional presuppositions recovered from (32) and (33) would be as shown below:

(32) Ali flew **back** from New York. [=(23)]
$\Rightarrow$ defined iff $\exists$ *prior event of Ali* ***flying to New York***.

(33) The door swung **back** open. [=(26)]
$\Rightarrow$ defined iff $\exists$ *prior event of the door* ***swinging shut***.

The null hypothesis might work for simple cases, where the sentence is presented out of the blue, meaning the only source from which to recover the right presupposition is the sentence itself. However, the addition of even minimal context reveals that the presupposed event need not be of the same kind: the presupposition of (34a) is satisfied by a prior event of Ali *taking a train* to New York; he does not have to have *flown* there. Similar facts obtain in (34b) and (34c).

4 Dobler (2008) does not distinguish spatial/non-spatial cases; whether the change is of state (adjectival) or location (PP), only direct causation is needed for a sentence to have a restitutive reading.

(34) a. Ali took the train to New York and then flew **back**. REVERSED PATH

b. The door creaked shut and then swung **back** open. RESTITUTIVE

c. Ali shook Bina's hand and Bina hugged him **back**. RESPONSE

Thus, the reverse of an event of R along path p is not simply an event of R along the reverse path p'; the presupposed event does not have to contain the same predicate as the asserted event:

(35) GENERALIZATION 2: The predicate can vary across the two events.

Hindi-Urdu and Dutch corroborate this finding: in (36) and (37) below, the following underspecified presupposition is sufficient to capture the right definedness condition: *There is an earlier event of Ada/Ali doing something along a reverse spatial path ending at school*.

(36) Ada fietste naar school. Ze liep **terug**.
Ada cycle to school she walked back
'Ada cycled to school. She walked back.' *Dutch (Zwarts 2019)*

(37) ali saikil calaakar skuul gayaa, bhaagkar **vaapas** aayaa.
Ali cycle walk.CONJ.PRT school go.PFV run.CONJ.PRT back come.PFV
'Ali went to school cycling and (he) came back running.' *Hindi-Urdu*

The recovery of P' from the context in Zwarts' model seems to require a peculiar operation that we can informally describe as "give me everything about the event except its path and time specifications". It is not obvious how the path specification can be removed, as normally it is impossible to perform operations on components of a fully-built neo-Davidsonian conjunction of event properties like [Agent(e)=Ali & Source(e)=New York &...] and so on. In the next subsections I work towards replacing the problematic free variable P' with more specific requirements.

3.3 The dependence of the scalar attribute

Though the predicate can vary across the asserted and presupposed event, the underlying scalar attribute involved must be the same in both. In (38a) we see a peculiar sequence involving change-of-state verbs.

(38) a. Aman dirtied the room, then Ben {cleaned/#warmed} it **back** up.

b. Aman dirtied the room, then Ben {cleaned/warmed} it up.

c. If the room gets too cold, you can warm it back up using the thermostat.

In (38a) there is an event of someone *dirtying* a room, causing a change in the value of cleanliness held by the room. It is infelicitous to follow this with an event of someone *warming* the room *back* up, i.e. causing a change in the value of temperature held by that room. The sequence in (38a) has a flavour of *non sequitur*; unless we accommodate a prior event of the room cooling down, it is infelicitous. We can confirm that this effect is due to BACK, as the sentence without *back* (38b) does not have this flavour, and the phrase *warm it back up* is grammatical by itself.

This pattern in change-of-state events can be explained by restricting BACK to cases where the two events involve the same SCALE; as for directed motion events, they all involve a spatial scale and therefore all satisfy this generalization:

(39) GENERALIZATION 3: The SCALE must be the same across the two events.

3.4 The dependence of the entity undergoing change

A further constraint on the content of reverse events is a requirement that the moving entity (THEME) must be common to both events. This is illustrated below in two ways. First, consider (40): Tara reversing the path traversed in the first event is infelicitous because that path was traversed by Lisa, and Tara $\neq$ Lisa.

(40) Lisa flew from Delhi to London. A day later, #Tara flew back to Delhi.

This sequence of THEME-mismatch produces a flavour of *non sequitur* similar to cases of SCALE-mismatch: the sentence containing BACK is quite easy to accept if one accommodates a proposition that is not actually present in the context: either that Tara also happened to have travelled in the past from Delhi to London (and presumably embarked on this return journey from there), or that somehow Tara and Lisa are the same person. There is pressure to accommodate this latter situation: (40) has the implicature that Tara *is* Lisa, in disguise. From this we can conclude that normally, the entity undergoing movement or progression along the path needs to be the same in the asserted and the presupposed event; deviations from this pattern causes implicatures of the "disguise"-kind. The final generalization is:

(41) GENERALIZATION 4: The THEME must be the same across the two events.

3.5 Summary

To summarize, the desiderata for a semantics of BACK are as follows:

(42) a. BACK refers to two events with reverse directions of scalar change.
b. Across the two events,
i. the SCALE and THEME must be the same, but
ii. the predicate does not have to be the same.

4 Analysis

The preceding discussion makes it clear that concepts like counterdirectionality or reverse events are convenient but ultimately overly broad labels that do not capture the requirements imposed by BACK on the context in which it appears.

Central to the requirements of BACK is the family resemblance of the REVERSED PATH and RESTITUTIVE cases, which reflects a fundamental equivalence between paths and scales, both in the way that natural language refers to them, and in their own internal mereological structure. A statement of this equivalence from Rappaport Hovav & Levin (2010) can be summarized as follows. Verbs denoting events of scalar change lexically specify a scale—a series of points or intervals indicating measurement values on some ordered dimension (e.g., location, cleanness, temperature, wholeness). The dimension corresponds to an attribute held by the verb's argument, and degrees to the specific values of that attribute. A scalar change in an entity involves a change in value of this attribute along the scale, in a direction specified by an ordering relation (e.g., direction of movement, getting cleaner or dirtier, getting cooler or hotter, turning into a whole or into parts). The THEME is the entity which undergoes the change of state or location (Maling 2001).

4.1 Change along a SCALE

Verbs of change-of-state denote a scalar change undergone by the THEME in the property domain. This change is established via a comparison of the degree to which a scalar attribute holds of the THEME at the beginning of the event versus at the end of the event. The particular scalar attribute may be associated with a range of possible values, e.g. *the water is d-warm*, where there are many degrees or values of *d* on the temperature scale that count as *warm*. Alternatively, it may have just two values corresponding to YES (has the attribute) and NO (does not have the attribute), e.g. *the glass is cracked*, where there are just two values on the degenerate scale of non-cracked versus cracked (if something has even a tiny crack, it is *cracked*). There are then verbs *(to) warm* and *(to) crack* corresponding to these two-valued attributes.[5]

Analogously, verbs of directed motion denote a scalar change undergone by the THEME in the spatial domain. Similar to change-of-state verbs, there are two sub-categories. First, verbs like *descend*, where there are many positions lower in the vertical space than the starting point that satisfy the truth conditions of *descend*. Second, verbs like *arrive* and *leave*, with only two values, once again corresponding to YES and NO. For a verb like *arrive*, YES means at the end of the event the THEME

5 Beavers (2008) distinguishes "minimally complex objects" (exactly two subparts), from "complex objects" (at least three subparts).

is located *at* the reference object (it has *arrived*); for *leave*, YES means at the end of the event the THEME is located *not at* the reference object (it has *left*).

To make explicit the idea of scalar change as a singular property that unites directed motion verbs and change-of-state verbs, I give some example lexical entries for these types of verbs. In (43) is the directed motion verb *(to) come*; in (44) is the change-of-state verb *to heat*, which specifies that the value on the temperature scale at the end of the event must be higher than at the start.

(43) $[\![\textit{(to) come}]\!]_{\langle e,vt\rangle}$ *directed motion*
$= \lambda x_e \lambda e_v[\textsc{scale}(e) = \textsc{location} \wedge \textsc{theme}(e) = x \wedge \textsc{trace}(e)(0) = s^* \wedge \textsc{trace}(e)(1) = g^*]$

(44) $[\![\textit{(to) heat}]\!]_{\langle e,vt\rangle}$ *change of state*
$= \lambda x_e \lambda e_v[\textsc{scale}(e) = \textsc{temperature} \wedge \textsc{theme}(e) = x \wedge \textsc{trace}(e)(0) = s^* \wedge \textsc{trace}(e)(1) = g^* \wedge g^* > s^*]$

In the lexical entries above we see a similar pattern: the scalar value that holds of the THEME at the start of the event is denoted by $\textsc{trace}(e)(0)$, and the scalar value that holds of the THEME at the end of the event is denoted by $\textsc{trace}(e)(1)$. The function TRACE (modelled on Krifka 1998; Link 1998, following Zwarts 2019) takes as arguments the event variable and an index, and returns the scalar value held by the THEME at that index.

I use s^* and g^* to indicate the values of Source and Goal derived from the context. The expression $\textsc{scale}(e)$ specifies the domain of scalar change; for directed motion verbs, the domain of scalar change is always the spatial domain, but there may be further specifications, e.g. motion in the vertical plane (*ascend*, *descend*). We are not concerned here with manner specifications, as these constitute non-scalar changes (Rappaport Hovav 2014), but they may be additionally present in the lexical entry. Finally, there is always the possibilty of further lexicalized information in the denotation of each individual verb; for instance *(to) come* may require specification for perspectival properties; these further properties are irrelevant to BACK and therefore I ignore them.

When the scalar change is in the spatial domain, BACK produces REVERSED PATH readings; when it is in the property domain, BACK produces readings traditionally referred to as RESTITUTIVE. While Rappaport Hovav (2014) is focused on *lexicalized* properties of verbs, for BACK it need not be the verb that lexicalizes the necessary scalar change; the scalar meaning may arise from a different source, often a PP. In the motion domain: *(to) roll* is not by itself directed motion, but it can acquire the character of directed motion with a PP, e.g. in *(to) roll to the corner*. The fact that BACK can occur in these situations, e.g. in *roll back (to the corner)*, shows that the adverb is indifferent to the source of the scalar component. In the

change-of-state domain too, the presence of PP-results can affect the nature of the event as a whole. For example (adapted from Rappaport Hovav 2008; Beavers 2008), though *scrub* does not lexicalize an end state, it is compatible with an end state: *Max scrubbed the pan to shiny silver*. The sentence can only host *back* if that end state is provided: *Max scrubbed the pan back *(to shiny silver)*.

4.2 An impoverishment of paths

A striking feature of the lexical entries sketched above is that while the start point and end point are explicitly encoded, interim points are not, and need not even exist: consider a verb like *(to) clean*, slightly different from *(to) heat* because here we cannot appeal to a scale of absolute values as we could with *heat*, where temperature is the relevant attribute. We can, however, identify what constitutes something being *clean*, and what does not. The lexical entry would look like this:

(45) $[\![\textit{(to) clean}]\!]_{\langle e,vt\rangle}$
$= \lambda x_e \lambda e_v [\textsc{scale}(e) = \textsc{cleanness} \wedge \textsc{theme}(e) = x \wedge$
$\textsc{trace}(e)(0) = \neg\textsc{clean} \wedge \textsc{trace}(e)(1) = \textsc{clean}]$

The above case differs in an important way from both the *heat*-type verbs, and the *come*-type verbs discussed above, because unlike the previous cases we have here a two-point scale. While the process of cleaning can of course be gradual and occur over an extended period of time, the part of the meaning that defines the verb is the transition from ¬CLEAN to CLEAN. We can define a verb like *(to) crack* in a similar fashion, as shown below, where the relevant domain of scalar change can be imagined as WHOLENESS, and the corresponding transition as WHOLE to ¬WHOLE.

(46) $[\![\textit{(to) crack}]\!]_{\langle e,vt\rangle}$
$= \lambda x_e \lambda e_v [\textsc{scale}(e) = \textsc{wholeness} \wedge \textsc{theme}(e) = x \wedge$
$\textsc{trace}(e)(0) = \textsc{whole} \wedge \textsc{trace}(e)(1) = \neg\textsc{whole}]$

In general, BACK-adverbs are not sensitive to whether the scalar change consists of only two values, or more. In Hindi-Urdu, we can create an illustrative minimal pair in (47), with punctual *pohonc* 'arrive' and durative *bhaag* 'run'—both are good with *vaapas* 'back'.

(47) a. sab log {vaapas | #ek ghante tak} pohonce
all people {back | #for an hour} arrive.PFV
Lit. 'Everyone arrived back/#for an hour.'

b. sab log {vaapas | ek ghante tak} bhaage
all people {back | for an hour} run.PFV
Lit. 'Everyone ran back/for an hour.'

A conclusion we can draw from the above discussion is that the requirements of BACK are satisfied by any path whose end points are known. There is a further simplification that can be effected, which I illustrate using (48), a pushing event by Road Runner, resulting in Wile E. ending up *off the cliff*.

(48) Road Runner pushed Wile E. Coyote back off the cliff.

In (48), it is enough that Wile E. is off the cliff at the end, there is no need for the context to specify how far he fell, whether he kept falling forevermore, or where he ultimately landed. This sentence suggests that the part of the motion that is *relevant* to BACK can be reduced to a 2-point scale that consists of the states ON_CLIFF and OFF_CLIFF. We can understand this statement as a sufficiency condition:

(49) *Sufficiency condition for back*
The value of the end point of the asserted event is the only information that is required in order for BACK to convey the reversal of a path.

The statement in (49) matches intuitions about a sentence like (50a) below. This sentence is true even if before reaching San Francisco, Ali had a layover in Denver; or if he started his journey, got waylaid and had to re-start it; or in a variety of other travel-disaster situations. As long as he started in New York and ended in San Francisco, the presupposition of the adverb is satisfied. We can eliminate the start-state of the asserted event altogether, as in (50b): here we only know that Ali ended up in San Francisco where he originated, irrespective of where he had been in between, or from what place he began the journey of his return to San Francisco.

(50) a. Ali flew back from New York to San Francisco.

b. Ali came back to San Francisco (after many years).

The characteristic ability of counterdirectionality to allow all sorts of stops, starts, false starts, backtracking, and delays suggests that the events we are considering are simply silent on what happens *between* the start and the end.

4.3 A revised semantics for counterdirectionality

In (51) is a first attempt at rewriting Zwarts's lexical entry. The free variable P' is no longer required once the more specific constraints are included, namely $\text{SCALE}(e') = \text{SCALE}(e)$ and $\text{THEME}(e') = \text{THEME}(e)$. Other parts of the event description are not hard-wired into the denotation, and they are therefore permitted to mismatch without having to explicitly encode that freedom. Inherited from Zwarts (2019) is the inclusion of PATH, and the REVERSE function.

(51) $[\![\text{BACK}]\!] = \lambda P_{\langle v,t\rangle}.\lambda e_{\langle v\rangle} : \exists e'[e' \prec e \wedge \text{SCALE}(e') = \text{SCALE}(e) \wedge \text{THEME}(e') = \text{THEME}(e) \wedge \text{REVERSE}(\text{PATH}(e), \text{PATH}(e'))].E(e)$

We can go a step further by replacing the REVERSE and PATH components with a TRACE function: $\text{TRACE}(e)(0)$ denotes the scalar value that holds of the THEME at the *start* of the event, and $\text{TRACE}(e)(1)$ the value at the *end*.

(52) *Proposed lexical entry for* BACK
$[\![\text{BACK}]\!]_{\langle\langle vt\rangle\langle vt\rangle\rangle}$
$= \lambda P_{\langle vt\rangle}\lambda e_v.\exists e'[e'_v \prec e \wedge \text{SCALE}(e') = \text{SCALE}(e) \wedge \text{THEME}(e') = \text{THEME}(e) \wedge \text{TRACE}(e')(0) = \text{TRACE}(e)(1)].P(e)$

5 Conclusion and remaining puzzles

In this paper I have demonstrated that counterdirectionality is an independent route to restitutive readings. This demonstration has involved a significant revision of what constitutes the counterdirectional presupposition. My proposal bears the advantage that the presupposition is *directly* retrievable from the content of the assertion or prejacent itself, making BACK more like presupposition triggers which presuppose their entire prejacent.

(53) *Revised counterdirectional presupposition (alternative version)*
There exists a temporally prior event with the following components copied from the assertion: the entity undergoing scalar change, the domain of change, and the end point of the change.

Something I did not address in this paper is the question of how to account for RESPONSE readings. Descriptively, these are readings which may lack a THEME altogether and do not involve scalar change. These readings exemplify a *non-scalar* use of BACK, where the end point of a communicative event (usually an animate recipient) is the start point (originator) of the prior communicative event.

Another issue I did not address is that the $\text{THEME}(e') = \text{THEME}(e)$ may be too strong. The existence of felicitous sequences with different THEMES suggests that the effect of identity may better be analyzed as a cancellable implicature:

(54) a. Bob emigrated in the fifties. His family came **back** to Holland recently.

b. I took a book off the shelf. Later, I put a book **back** on the shelf.

A formalization of RESPONSE readings and a weakening of the THEME-identity requirement I leave to future work (see Iyer forthcoming for an attempt).

References

Beavers, John. 2008. Scalar complexity and the structure of events. In Johannes Dölling, Tatjana Heyde-Zybatow & Martin Schäfer (eds.), *Event Structures in Linguistic Form and Interpretation*, 245–266. Walter de Gruyter. doi:https://doi.org/10.1515/9783110925449.245.

Beck, Sigrid & Kyle Johnson. 2004. Double Objects Again. *Linguistic Inquiry* 35(1). 97–123. doi:10.1162/002438904322793356.

Dobler, Eva. 2008. Again and the structure of result states. *15th Editition of the Conference of the Student Organisation of Linguistics in Europe (ConSOLE XV)* 42–66.

Fabricius-Hansen, Cathrine. 1983. Wieder éin *wieder*? Zur Semantik von *wieder*. *Meaning, Use and Interpretation of Language* 97–120. doi:https://doi.org/10.1515/9783110852820.97.

Fabricius-Hansen, Cathrine. 2001. Wi(e)der and again(st). In Caroline Féry & Wolfgang Sternefeld (eds.), *Audiatur Vox Sapientiae: A Festschrift for Arnim von Stechow*, vol. 52 Studia Grammatica, 101–130. Berlin: Akademie Verlag. doi:https://doi.org/10.1515/9783050080116.10.

Iyer, Jyoti. forthcoming. *Counterdirectionality in the Grammar: Reversals and Restitutions*: University of Massachusetts Amherst PhD dissertation.

Krifka, Manfred. 1998. The origins of telicity. In *Events and Grammar*, 197–235. Springer. doi:https://doi.org/10.1007/978-94-011-3969-4_9.

Link, Godehard. 1998. *Algebraic Semantics in Language and Philosophy*. CSLI Publications.

Maling, Joan. 2001. Dative: The heterogeneity of the mapping among morphological case, grammatical functions, and thematic roles. *Lingua* 111(4-7). 419–464.

Patel-Grosz, Pritty & Sigrid Beck. 2014. Revisiting *again*: The view from Kutchi Gujarati. *Sinn und Bedeutung (SuB)* 18. 303–321.

Patel-Grosz, Pritty & Sigrid Beck. 2019. Different *again*. *Semantics and Pragmatics* 12(3). 1–52. doi:10.3765/sp.12.3.

Rappaport Hovav, Malka. 2008. Lexicalized meaning and the internal temporal structure of events. *Theoretical and Crosslinguistic Approaches to the Semantics of Aspect* 13. doi:https://doi.org/10.1075/la.110.03hov.

Rappaport Hovav, Malka. 2014. Building scalar changes. In Artemis Alexiadou, Hagit Borer & Florian Schäfer (eds.), *The Syntax of Roots and the Roots of Syntax*, 259–281. Oxford: Oxford University Press. doi:https://doi.org/10.1093/acprof:oso/9780199665266.003.0012.

Rappaport Hovav, Malka & Beth Levin. 2010. Reflections on manner/result complementarity. *Syntax, Lexical Semantics, and Event Structure* 21–38. doi:https://doi.org/10.1093/acprof:oso/9780199544325.003.0002.

Stechow, Arnim Von. 1995. Lexical decomposition in syntax. In Urs Egli, Peter E. Pause, Christoph Schwarze, Arnim von Stechow & Götz Wienold (eds.), *Lexical Knowledge in the Organization of Language*, vol. 13, Amsterdam: John Benjamins. doi:https://doi.org/10.1075/cilt.114.05ste.

Stechow, Arnim Von. 1996. The different readings of *wieder* 'again': A structural account. *Journal of Semantics* 13. 87–138. doi:https://doi.org/10.1093/jos/13.2.87.

Zwarts, Joost. 2019. From back to again in Dutch: The structure of the re domain. *Journal of Semantics* 36(2). 211–240. doi:10.1093/jos/ffy017.

Jyoti Iyer
650 North Pleasant Street
University of Massachusetts
Amherst, MA 01003
jiyer@umass.edu