Building Resultatives

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August 2004[1]

1. The construction: Adjectival resultatives

Some natural languages allow their speakers to put together a verb and an adjective to create complex predicates that are commonly referred to as "resultatives". Here are two run-of-the-mill examples from German[2]:

(1) Die Teekanne leer trinken
The teapot empty drink
'To drink the teapot empty'

(2) Die Tulpen platt giessen
The tulips flat water
Water the tulips flat

Resultatives raise important questions for the syntax-semantics interface, and this is why they have occupied a prominent place in recent linguistic theorizing. What is it that makes this construction so interesting? Resultatives are submitted to a cluster of not obviously related constraints, and this fact calls out for explanation. There are tough constraints for the verb, for example:

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[1]. To appear in Claudia Maienborn und Angelika Wöllstein-Leisten (eds.): Event Arguments in Syntax, Semantics, and Discourse. Tübingen, Niemeyer.

Thank you to Claudia Maienborn and Angelika Wöllstein-Leisten for organizing the stimulating DGfS workshop where this paper was presented, and for waiting so patiently for its final write-up. Claudia Maienborn also sent comments on an earlier version of the paper, which were highly appreciated.

[2]. (2) is modeled after a famous example in Carrier & Randall (1992).

(3) a. Er hat seine Familie magenkrank gekocht.
He has his family stomach sick cooked.
'He cooked his family stomach sick.'

b. * Er hat seine Familie magenkrank bekocht.
He has his family stomach sick cooked-for

And there are also well-known restrictions for the participating adjectives (Simpson 1983, Smith 1983, Fabb 1984, Carrier and Randall 1992):

(4) a. * The chef cooked the food blackened.

b. * The joggers ran themselves exhausted.

As for semantic interpretation, resultatives are a species of causatives, where the causal relation is always direct causation. Where does this particular interpretation come from? It doesn't seem to be contributed by either the adjective or the verb alone. Do we have to conclude, then, that constructions all by themselves can introduce meaning components as specific as causal relations? Looking beyond German and English, we observe that not every language has resultatives: The Romance languages don't, for example. Does this mean that there is a 'resultative parameter'?

In this paper, I will develop an event-based analysis of (mostly German) resultatives with the above questions in mind. I will argue that the causal relation in resultatives is carried by an unpronounced affix attached to the adjective. Resultatives do not force us to assume that syntactic constructions or semantic composition rules can introduce non-logical meaning components like causal relations. I will also work towards a hypothesis that links the constraints for the verbs and adjectives in German resultative constructions to more general properties that might eventually tell us what it takes for a language to have resultative constructions to begin with. In interaction with a standard event semantics, simple morphological properties conspire to allow or disallow resultatives and force them to behave the way they do.

Before embarking on a systematic exploration, a word of caution is in order. Resultative constructions have to be distinguished from depictives, which involve a verb and an adjective, but do not have a causal interpretation.

(5) J'ai connu Marie heureuse. Depictive Construction
I have known Marie happy.
I have known Marie happy
Legendre (1997), 45

Resultatives built from verbs and adjectives must also be distinguished from directional particle constructions, which have a causative interpretation, but do not involve adjectives.

(6) Den Abfall rausbefördern. Directional Particle + Verb
The garbage out-transport.
'take the garbage out'

Inclusion of directionals in discussions of resultatives has obscured important generalizations that emerge clearly once we restrict our enterprise to resultatives built from adjectives. Nevertheless, directionals have interesting properties of their own that merit investigation and invite comparison with other types of resultatives. I will discuss one characteristic property of directional particles in section 3, but I won't be able to develop an analysis of directionals here.

2. Deriving the Direct Object Restriction from a raising analysis

Resultatives have long been known to have a special relationship with direct objects (Simpson 1983). This relationship is reflected in Levin and Rappaport Hovav's (1995) Direct Object Restriction, which says that a result phrase "may be predicated of the immediately postverbal NP, but may not be predicated of a subject or of an oblique complement" (p.34). Where could such a generalization come from? In the best of all possible worlds it would fall out from an analysis of resultatives and would not have to be stipulated. To have a concrete example to look at, take example (1) from above, repeated here as (7):

(7) Die Teekanne leer trinken
The teapot empty drink
'To drink the teapot empty'

In an influential paper (Hoekstra 1988), Teun Hoekstra argued that resultatives project a raising structure. Within the framework I want to assume here, this seems to be the only option for (7). The DP *die Teekanne* ('the teapot') is an argument of *leer* ('empty'), not of *trinken* ('drink'). That DP must therefore start out within the projection of *leer*, assuming that, in the syntax, arguments have to start out within the projection of their heads. Making the additional assumption that the unique (non-eventuality) arguments of adjectives are internal, rather than external arguments, no further small clause or predication structure has to be built. In fact, as I will argue shortly, no functional structure can be built on top of the AP headed by *leer*. This lack of functional structure, I will suggest, forces a raising analysis like the one sketched in figure 1:

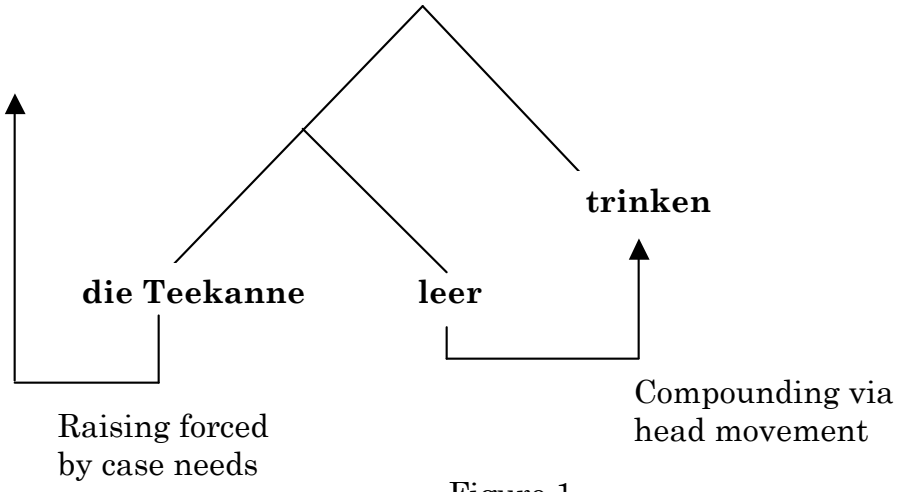

Figure 1

The analysis I am proposing for (7) is a raising analysis like Hoekstra's. Technically, it's not the usual small clause analysis, though. I am not assuming, as did Stowell (1983), that external arguments of adjectives originate within the projection of their head. My adjectives do not have external arguments. They couldn't, since they lack voice, which, at least according to the story told in Kratzer (1996), is responsible for the introduction of external arguments. Voice inflection is by necessity verbal inflection, hence can only build verbal projections. From its base position within the projection of the adjective *leer*, *die Teekanne* moves up into the functional structure of *trinken* to check its accusative case features, possibly triggering incorporation of *leer* into *trinken*. This is how *die Teekanne* becomes a

direct object of the compound *leer trinken* ('empty drink') and acquires some of the typical properties we associate with direct objects.

A raising analysis is plausible enough for cases like (7). But can it be defended for all kinds of resultatives? If it could, the Direct Object Restriction would follow, since on a raising account, the unique (non-event) argument of the adjective becomes a derived direct object, not a subject or oblique object. The most pressing question we have to look into, then, is whether a raising analysis is indeed viable for all resultatives. Suppose it is. Resultatives should then always come with an originally intransitive verb, that is, with a verb that does not start out its life in syntax with a direct object of its own. This prediction looks quite wrong. The literature is full of examples where resultatives seem to be able to combine with transitive or unaccusative verbs. Nevertheless, I will argue that a raising analysis is at least correct for all those resultatives that are built with the help of adjectives. Even in this qualified version, the claim goes against widely held beliefs. Usually, a raising analysis is taken to be untenable for the kind of resultatives we see in (8), which are from Carrier and Randall (1992, 115). Those resultatives seem to be able to combine with transitive or unaccusative verbs:

(8) a. The gardener watered the tulips flat.
b. The pond froze solid.

I will show in the following section that in spite of many apparent counterexamples, there really aren't any good cases of adjectival resultatives that combine with transitive or unaccusative verbs. This result will pave the way for a raising analysis for all kinds of adjectival resultatives, including those exemplified by 8(a) and (b).

3. No transitives or unaccusatives

Look at the following German transitive / intransitive alternations[3]:

[3] . The star in front of the (d) examples means that the sentence is ungrammatical as a resultative construction. In some cases, the sentence is acceptable when the adjective can be understood as a depictive or a manner adverb.

(9) a. Er hat gekocht.
He has cooked.
He cooked.

b. Er hat seine Familie magenkrank gekocht.
He has his family stomach sick cooked.
'He cooked his family stomach sick.'

c. Er hat * (seine Familie) bekocht.
He has his family (acc.) cooked-for
He cooked for his family.

d. * Er hat seine Familie magenkrank bekocht.
He has his family stomach sick cooked-for

(10) a. Sie haben geschossen.
They have shot.
They shot.

b. Sie haben ihn tot geschossen.
They have him dead shot

c. Sie haben * (ihn) erschossen.
They have him (acc.) shot-dead
They shot him dead.

d. * Sie haben ihn tot erschossen.
They have him dead shot-dead

(11) a. Sie haben (unser Geld) geraubt.
They have our money robbed.
They robbed our money.

b. Sie haben uns arm geraubt.
They have us poor robbed.
'They robbed us poor.'

c. Sie haben * (uns) beraubt.
They have us (acc.) robbed-from.
They robbed us.

d. * Sie haben uns arm beraubt.
They have us poor robbed-from.

(12) a. Sie hat gebetet.
She has prayed.
She prayed.

b. Sie hat dich gesund gebetet.
She has you healthy prayed.
'She prayed you healthy.'

c. Sie hat * (dich) angebetet.
She has you (acc.) adored.
She adored you.

d. * Sie hat dich gesund angebetet.
She has you healthy adored.

(13) a. Sie hat gequasselt.
She has babbled.
She was babbling away.

b. Sie hat uns tot gequasselt.
She has us dead babbled.
'She babbled us dead.'

c. Sie hat * (uns) bequasselt.
She has us (acc.) babbled-at.
She was babbling at us.

d. * Sie hat uns tot bequasselt.
She has us dead babbled-at.

(9) to (13) illustrate the behavior of intransitive / transitive verb alternants in adjectival resultative constructions. In each case, the intransitive verb is acceptable, but its transitive counterpart is not. That transitivity is the relevant property, and not telicity, is shown by (9), (12) and (13)[4]. The verbs *bekochen* ('cook for'), *anbeten* ('adore') and *bequasseln* ('babble at') are

[4]. The notion of transitivity needed to account for the data in (9) to (13) doesn't coincide with Levin's (1999) notion of 'core transitive verb'. For Levin, the core transitive verbs are those that have a "causative event structure", hence are causatives. But at most one of the essentially transitive verbs in (9) to (13) is a causative (*erschiessen*, 'shoot dead'). The

as atelic as the simplex verbs they are derived from. They do not characterize a target state as part of their meaning. They also combine happily with durational phrases. This means that we cannot exclude the ungrammatical resultatives in (9) to (13) by appealing to some version of what has been called "Tenny's Generalization", requiring that no simple or complex predicate can characterize more than one target state (Tenny 1987, Giannakidou & Merchant 1998). The ban on transitives in resultative constructions would be entirely expected if adjectival resultatives were uniformly raising constructions. A raising analysis for resultative constructions assumes that the direct objects we see in those constructions are always syntactically derived. The verbs appearing with such resultatives should never have an obligatory direct object of their own, then. They should never start out as transitives or unaccusatives.

Unfortunately, there are lots of examples that seem to upset the generalization suggested by (9) to (13). Here is a rather nasty looking batch:

(14) a. Sie haben * (den Fußballplatz) beleuchtet.
They have the soccer field illuminated.
They illuminated the soccer field.

b. Sie haben den Fußballplatz hell beleuchtet.
They have the soccer field bright illuminated.

(15) a. Sie haben * (die Patienten) ausgezogen.
They have the patients undressed.
They undressed the patients.

b. Sie haben die Patienten nackt ausgezogen.
They have the patients nude undressed

(16) a. Sie haben * (das Fleisch) angebraten.
They have the meat at-roast.
'They briefly roasted the outside of the meat.'

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direct objects of the other verbs denote the benefactor, source, or goal of the events described by the verb.

b. Sie haben das Fleisch braun angebraten.
They have the meat brown at-roasted

(17) a. Sie haben * (den Laster) beladen.
They have the truck loaded.
They loaded the truck.

b. Sie haben den Laster schwer beladen.
They have the truck heavy loaded

(18) a. Sie haben * (die Wand) bemalt.
They have the wall painted.
They painted the wall.

b. Sie haben die Wand blau bemalt.
They have the wall blue painted.

(19) a. Sie haben * (den Teig) ausgerollt.
They have the dough out-rolled.
They rolled out the dough.

b. Sie haben den Teig dünn ausgerollt.
They have the dough thin out-rolled

The examples in (14) to (19) have verbs that are obligatorily transitive, just like the verbs in (9) to (13). Yet all of those verbs seem to be able to participate in adjectival resultative constructions. Fortunately, the threat of (14) to (19) is not too hard to divert. Look at the following set of short dialogues:

(20) a. Wie soll ich den Fußballplatz beleuchten? Hell.
How shall I the soccer field illuminate? Bright.
'How shall I illuminate the soccer field? Bright.'

b. Wie soll ich die Patienten ausziehen? Nackt.
How shall I the patients undress? Nude.
'How shall I undress the patients? Nude.'

c. Wie soll ich das Fleisch anbraten? Braun.
How shall I the meat at-roast? Brown.
'How shall I roast the meat? Brown.'

d. Wie haben sie den Laster beladen? Viel zu schwer.
How have they the truck loaded? Much too heavy.
'How did they load the truck? Much too heavy?'

e. Wie haben sie die Wand bemalt? Blau.
How have they the wall painted Blue.
'How did they paint the wall? Blue.'

f. Wie haben sie den Teig ausgerollt? Dünn.
How have they the dough out-rolled Thin.
'How did they roll the dough? Thin.'

The data in (20) suggest that the apparent adjectives in (14) to (19) do not have to be parsed as adjectives, but might also be parsed as adverbs. In German, manner adverbs and predicative adjectives look exactly alike, and this makes it hard to keep the two apart in certain cases. In 20(a), *hell* ('bright') relates to the intensity of the illumination. When you illuminate a place brightly (note the use of the English adverb), it becomes bright. Likewise, when you undress completely (again, note the adverb in English), you end up nude. Different ways of roasting meat can be distinguished by their effect on the meat's outside color. When you load a truck heavily, the truck ends up with a heavy load, and that makes the truck heavy, too. Using different paints to paint walls can be seen as different ways of painting walls. If you roll out the dough just a little bit, it ends up being thick. The more you roll it and the more pressure you apply, the thinner it gets.

In English, too, adverbs can appear without the suffix *–ly* in certain cases, hence might look exactly like adjectives. Here are some examples from the Longman grammar (Quirk, Greenbaum, Leech & Svartik 1985, sections 7.6 to 7.9):

(21) a. Danger, go slow.
b. Did you have to wait long?
c. She cut her hair short.
d. The flowers smell sweet.
e. Don't talk daft.
f. She pays her rent regular.
g. They played real good.
h. He spoke to John sharp.

i. Speak clearer.

j. The car went slower and slower.

k. They played the game clean.

l. She travels light.

m. The food tastes marvelous.

n. That's easier said than done.

o. He behaves even worse than his brother.

It is not impossible, then, that even in English, apparent adjectives in a resultative construction might sometimes be parsed as adverbs. Returning to German, there is a sharp contrast between 20(a) to (e) and the following examples, which are completely unacceptable on the intended readings:

(22) a. * Wie hat er seine Familie gekocht? (Magenkrank.)
How has he his family cooked? (Stomach sick.)

b. * Wie haben sie ihn geschossen? (Tot.)
How have they him shot? (Dead.)

c. * Wie haben sie uns geraubt? (Arm.)
How have they us robbed? (Poor.)

d. * Wie hat sie dich gebetet? (Gesund.)
How has she you prayed? (Healthy.)

e. * Wie hat sie uns gequasselt? (Tot.)
How has she us babbled? (Dead.)

The apparent adjectives in (14) to (19), then, are adverbs. That adverbs can have resultative interpretations of their own is shown by the following examples:

(23) a. Finely chopped parsley

b. Nicely wrapped presents

c. Heavily loaded trucks

d. Brightly illuminated rooms

e. Beautifully manicured nails

f. Wonderfully arranged flowers

g. Perfectly grown oak trees
h. Magnificently painted ceilings
i. Coarsely grated carrots
j. Thinly spread layers of mayonnaise
k. Illegibly written notes

Not all adverbs in 24(a) to (k) have exactly the same interpretation as the corresponding adjectives would have. When a present is wrapped nicely, for example, it has a nice wrapping. It might still be rather ugly. Likewise, manicuring nails beautifully does not necessarily make your nails beautiful. There is only so much that nail polish can do. Nevertheless, adverbial and resultative interpretations often coincide, or are so close that they are hard to distinguish. The line between adjectives heading resultative phrases and adverbs is often very hard to draw, and in German, the systematic absence of any overt morphology for those adverbs blurs the boundaries even more.

I take it, then, that the data in (14) to (19) do not truly challenge the generalization that transitive verbs cannot co-occur with adjectival resultatives. The apparent adjectives in (14) to (19) can all be parsed as adverbs. Sometimes, describing a result brought about by an action can be seen as describing a way the action was performed. In those cases, it seems, adverbs can be easily confused with resultative adjectives, not only in German, but possibly also in English.

Transitivity is not always easy to diagnose. Sometimes, eyeballing the situation is not good enough, and more serious tests are needed. Take the following sentences:

(24) a. Sie haben ? (die Äpfel) gepflückt.
They have the apples picked.
They picked the apples.

b. Sie haben die Bäume kahl gepflückt.
They have the trees bare picked.
'They picked the trees bare.'

(25) a. Sie haben ? (das Auto) gekauft.
They have the car bought.
They bought the car.

b. Sie haben den Laden leer gekauft.
They have the shop empty bought.
'They bought the shop empty.'

(26) a. Sie haben ? (die Suppe) gelöffelt.
They have the soup eaten with a spoon.
'They ate the soup with a spoon.'

b. Sie haben den Teller leer gelöffelt.
They have the plate empty eaten with a spoon.
'They emptied the plate with a spoon.'

(27) a. Sie haben ?(die Garage) gebaut.
They have the garage built.
'They built the garage.'

b. Sie haben das Grundstück voll gebaut.
They have the plot full built
'They built the plot full.'

The resultatives in the (b)-sentences of (24) to (27) are all of the kind that seem to require a raising analysis. What is picked in 24(b) are not the trees, what is bought in 25(b) is not the shop, what is scooped up with a spoon in 26(b) is not the plate, and what is built in 27(b) is not the plot. The surface objects, then, cannot be arguments of the verbs in the (b)-sentences of (24) to (27). Nevertheless the verbs that come with those resultatives might wrongly be classified as obligatorily transitive based on the kind of contexts given in the (a)-sentences. Upon closer scrutiny, we find that all of those verbs have at least some intransitive uses. They do not require a direct object, for example, when they are 'reduplicated' to produce an iterative interpretation. We have:

(28) a. Sie pflückten und pflückten.
They picked and picked

b. Sie kauften und kauften.
They bought and bought

c. Sie löffelten und löffelten.
They ate (with a spoon) and ate (with a spoon)

d. Sie bauten und bauten.
They built and built

When we look at the alternating verb pairs in (9) to (13) above we find that the intransitive alternant can, but the transitive alternant cannot stand on its own when 'reduplicated'. As before, telicity cannot be what rules out those cases, since in (29), (32), and (33), the transitivized version of the verb is as atelic as its underived counterpart.

(29) a. Er kochte und kochte.
He cooked and cooked

b. * Er bekochte und bekochte.
He cooked-for and cooked-for

(30) a. Sie schossen und schossen.
They shot and shot

b. * Sie erschossen und erschossen.
They shot-dead and shot-dead

(31) a. Sie raubten und raubten.
They robbed and robbed

b. * Sie beraubten und beraubten.
They robbed-from and robbed-from

(32) a. Sie betete und betete.
She prayed and prayed.

b. * Sie betete an und betete an.
She adored and adored

(33) a. Sie quasselte und quasselte.
She babbled and babbled

b. * Sie bequasselte und bequasselte.
She babbled-at and babbled-at.

It is clear, then, that the verbs in (24) to (27) have at least some intransitive uses. The same is true of the verbs in the following resultatives that are not usually given a raising analysis, and where an adverbial analysis is at best marginally possible:

(34) a. Sie hat die Tulpen platt gegossen.
She has the tulips flat watered
She watered the tulips flat.

b. Sie goss und goss.
She watered and watered

c. * Wie hat sie die Tulpen gegossen? Platt.
How has she the tulips watered? Flat.
How did she water the tulips? Flat.

(35) a. Sie haben den Tisch sauber gewischt.
They have the table clean wiped.
They wiped the table clean.

.

b. Sie wischten und wischten.
They wiped and wiped

c. * Wie haben sie den Tisch gewischt? Sauber.
How have they the table wiped ? Clean.
How did they wipe the table? Clean.

When apparent resultative adjectives can be parsed as adverbs, the surface objects in those sentences are arguments of their respective verbs. It follows that what was illuminated in 14(b) from above, for example, was the soccer field and what was loaded in 17(b) above was the truck. On the other hand, if we want to defend a raising analysis for all resultative constructions with adjectives, we have to struggle with the fact that the surface direct objects we find in those constructions are never semantic arguments of their verbs, and this brings up the question of just how the clearly present inferences about the watering of the tulips in 34(a), for example, or the wiping of the table in 35(a) would come about. In order to see that such inferences can be accounted for even on a raising analysis, we have to look at the

semantic interpretation of resultatives in some detail. I will do so in the following section. The issue is a very important one. Carrier & Randall (1992) criticized Hoekstra's raising analysis as being unable to derive the fact that a sentence like 34(a), for example, implies that the tulips became flat as a result of having been watered. The criticism is unfounded. The desired inference falls out from the semantics, as we will see.

Like transitivity, unaccusativity is an elusive property and needs to be diagnosed with care. If a raising analysis is right for all types of (adjectival) resultatives, we shouldn't find any truly unaccusative verbs participating in that construction. Yet Levin and Rappaport Hovav (1995, 39, examples 19(a) to (e)) present the following examples:

(36) a. The river froze solid.
b. The prisoners froze to death.
c. The bottle broke open.
d. The gate swung shut.
e. This time the curtain rolled open on the court of the Caesars….
(Olivia (D. Bussy), Olivia, 35.)

Typical uses of the English verb *freeze* are illustrated in 37(a) to (c):

(37) a. It was freezing.
b. I was freezing.
c. The water froze yesterday.

The German counterpart of *freeze* in the translations of 37(a) to (c) shows mixed unaccusative/unergative behavior, as indicated by the use of the auxiliaries *sein* ('be') versus *haben* ('have')[5]:

(38) a. Es hat gefroren.
It has frozen.
'The temperature was below freezing.'

[5] . The (c)-example was provided by Claudia Maienborn, personal communication.

b. Ich hab' gefroren.
I have frozen.
'I was cold.'

c. Das Wasser ist gestern gefroren.
The water is yesterday frozen.
'The water froze yesterday.'

The German translation of *swing*, *schwingen*, also shows mixed unaccusative/unergative behavior. In standard German, it takes the auxiliary *haben*[6], hence behaves as an unergative.

Examples 36(c) and (e) cannot be done away with so easily. Those are not isolated cases either. Any of the following verbs can be used in a resultative construction:

(39) *Burst* (*open*), *pop* (*open*), *fly* (*open*), *tear* (*open*), *rip* (*open*), *crack* (*open*), *slide* (*open*).

The counterparts of intransitive *roll*, *break*, *burst*, *pop*, *fly*, *tear*, *rip*, *crack*, and *slide* are all unambiguously unaccusative in German. There is something special about *open*, though. Here, too, a look at German is revealing. German has an adjective *offen* and (what looks like) a separable prefix or verb particle *auf*, both meaning 'open'. *Offen* has attributive and predicative uses. When used attributively, it takes adjectival agreement morphology. *Auf* only allows predicative uses in Standard German. However, according to the Duden (Die Zweifelsfälle der deutschen Sprache), attributive uses with adjectival inflection occur in certain varieties of colloquial German. The Duden gives *die aufe Flasche* ('the open+Agr bottle') and *ein aufes Fenster* ('an open+Agr window') as examples. *Auf* and *open* are interchangeable in predicative uses of the kind illustrated in (40) to (42):

(40) a. Die Tür ist auf.
The door is open.
The door is open.

[6]. It is listed as taking the auxiliary *haben* in Kempcke's (2000) *Wörterbuch Deutsch als Fremdsprache*. My own dialect admits both *sein* and *haben* in cases like *The pendulum swung back and forth*.

b. Die Tür ist offen.
The door is open.
The door is open.

(41) a. Sie hat die Tür aufgelassen.
She has the door open-left.
She left the door open.

b. Sie hat die Tür offengelassen.
She has the door open-left.
She left the door open.

(42) a. Die Tür bleibt auf.
The door stays open.
The door stays open.

b. Die Tür bleibt offen.
The door stays open.
The door stays open.

I perceive a slight difference between *auf* and *offen* in resultative constructions:

(43) a. Die Wunde ist aufgeplatzt.
The wound is open-burst.
The wound burst open.

b. ? Die Wunde ist offengeplatzt.
The wound is open burst.

(44) a. Sie hat die Tür aufgebrochen.
She has the door open-broken.
She broke the door open.

b. ? Sie hat die Tür offengebrochen.
She has the door open-broken.

(45) a. Wir haben die Türen mit den Fäusten aufgehämmert.
We have the door with the fists open-hammered.
'We hammered the doors open with our fists.'

b. Wir haben die Türen mit den Fäusten offengehämmert.
We have the door with the fists open-hammered.
'We hammered the doors open with our fists.'

(46) a. Dieser Wunderhund kann sogar Türen aufbellen.
This miracle dog can even doors open-bark.
'This miracle dog can even bark doors open.'

b. Dieser Wunderhund kann sogar Türen offenbellen.
This miracle dog can even doors open-bark.
'This miracle dog can even bark doors open.'

(43) has an unaccusative verb. The verb in (44) is obligatorily transitive. In both cases, I find *offen* marginally - but only marginally - possible[7]. The verbs in (45) and (46) have unergative uses. *Offen* is as acceptable as *auf* there. The data suggest that there is insecurity about the categorial status of both *auf* and *offen*. Normative grammar tells us that *auf* is a separable prefix or verb particle, and *offen* is an adjective. But speakers' intuitions seem to blur the differences between the two. The appearance of adjectival inflection shows that *auf* is treated as an adjective by some speakers, hence is assimilated to *offen*. The marginal acceptability of *offen* in resultatives built with transitive or unaccusative verbs in my own idiolect might then indicate that after overcoming some initial resistance, I can categorize *offen* as a verb prefix or particle. The CHILDES database (MacWhinney 2000) documents the case of a child who consistently uses *offen* in resultative constructions with transitive verbs. Interestingly, each of those uses of *offen* is translated as *auf* in the transcriber's glosses. Wagner's Carsten corpus (Wagner 1985) has three occurrences of *offen machen* ('open make'. We find in line 392, for example: *Warum hast du meine Buchse offen gemacht* ('Why did you open my pants?'). The transcriber adds the gloss *Hose aufgemacht* ('pants opened'), translating the dialect word *Buchse* as standard *Hose*, as well as glossing the child's *offen* as adult standard *auf*[8]. The most interesting use of *offen* in the Carsten corpus occurs in line 4032, where it comes

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[7]. For Claudia Maienborn, 43(b) and (44(b) deserve two question marks.

[8]. Here are the other examples: Line 1494: *Wie soll ich denn offen* [% '*auf*'] *machen*? (How shall I open it?). Line 1498: *Auch ein Löffel damit offen machen* [% meint er möchte den Joghurtbecher mit einem Löffel öffnen]. (Means he wants to open the yogurt container with a spoon.)

with what is clearly an essentially transitive verb ('cover'): *hab i wieder offen gedeckt* ('I have again open covered', that is, 'I have again uncovered it'). The adult standard version of the child's verb *offendecken* is *aufdecken*, and that's the translation given by the transcriber. Those data suggest that Carsten might have started out with the hypothesis that *offen* is a particle. There is not a single occurrence of attributive *offen* in Carsten's speech in the CHILDES database, nor in the Clahsen or Miller corpora. In the Wagner corpus, attributive uses of *offen* only appear with Frederik, who is already 8;7 years old. Attributive adjectives are inflected in German, and this property is likely to play a role in triggering a recategorization. Since English does not have overt adjectival agreement morphology, *open* may live on as a hybrid in the adult language. There may indeed be something special about *open*, then. It may be able to act like a particle.

That English *open* is capable of the behavior of a particle is shown by examples (47) to (50) below, which are based on paradigms constructed by Joe Emonds and At Neeleman. The behavior of *open* in (47) and (48) matches the behavior of the verbal particles *out* and *off* in (49) and (50)[9]:

(47) a. The children cracked the nuts open.
b. The children cracked open the nuts.
c. The children cracked open and ate the nuts.
d. The children collected and cracked open the nuts.

(48) a. The police broke the door open.
b. The police broke open the door.
c. The police broke open and removed the door.

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[9] . Examples 47(c) & (d) and 48(c) & (d) are modeled after examples from Neeleman (1994). Neeleman discusses V-V coordination as a major argument for the existence of complex predicates, and gives the examples *John cut open and ate a watermelon yesterday* and *John bought and cut open a watermelon yesterday* (p. 33). For the relevant properties of verbal particles, see Emonds (1972, 1985), Fraser (1976), and Neeleman (1994). Examples 50(a) and (b) are from Emonds (1985), p. 253.

d. The police found and broke open the door.

(49) a. We threw out the documents.
b. We threw the documents out.
c. We threw out and shredded the documents.
d. We identified and threw out the documents.

(50) a. You shouldn't put off such tasks.
b. You shouldn't put such tasks off.
c. You shouldn't put off and neglect such tasks.
d. You shouldn't neglect and put off such tasks.

In contrast, the resultatives in (51) to (53) seem more reluctant to follow the pattern of (47) to (50):

(51) a. They painted the barn green.
b. ? They painted green the barn.
c. ? They painted green and sold the barn.
d. ? They bought and painted green the barn.

(52) a. He wiped the desk clean.
b. ? He wiped clean the desk.
c. ? He wiped clean and repainted the desk.
d. ? He examined and wiped clean the desk.

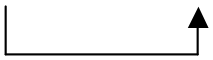
(53) a. They watered the tulips flat.
b. ? They watered flat the tulips.
c. ? They watered flat or picked the tulips.
d. ? They picked or watered flat the tulips.

The difference between (47) and (48) on the one hand, and (51) to (53) on the other suggest that particles can, but adjectives cannot that easily form PF-visible compounds with verbs.

Using a technique from Neeleman (1994), the (c) and (d) examples of (47) to (53) have coordinations where one of the conjuncts is a simple transitive V. Assuming parallelism – coordination conjoins equals with equals – we can reason that, if those examples are good, the other conjunct has to be a transitive V as well. If they are bad, there is likely to be a problem with compounding. So far so good, but why do we only find question marks, rather than stars in (51) to (53)? If in English, particles can form PF-visible compounds with verbs, but adjectives can't, shouldn't the (b), (c), and (d) examples of (51) to (53) be outright unacceptable, rather than merely marginal?

The likely reason for the question marks - rather than the expected stars - in (51) to (53) is the marginal availability of alternative syntactic parses that do not involve compound verbs. Take the (b) examples in (47) to (53). They could all be parsed as not-so-perfect cases of Heavy NP Shift. The direct object would then be extraposed, and there would be no compound verb. An analysis of particle constructions along those lines was in fact proposed by Richard Kayne (1985).

(54) He wiped t_i clean [the desk]$_i$



To discourage such a parse, I deliberately kept the direct objects short and light. As for the (c) and (d) examples in (47) to (53), they also have alternative parses. As Neeleman observes, they could be not-so-perfect Right Node Raising constructions. (55) is a typical Right Node Raising example[10]:

(55) His secondhand quotations distort, more than they represent his authors.

In (55), the object *his authors* is shared by two verbs, *distort* and *represent*. A better sounding Right Node Raising version of, say, 52(c) from above could now look as follows:

[10] . NY Times Book Review, Lisa Selkirk personal communication.

(56) He first wiped clean, and then repainted the desk he had inherited from his grandfather.

A Right Node Raising parse does not involve compound verbs (see e.g. Phillips (1996) for a syntactic analysis). It comes with a few strings attached, however. It requires a particular intonation, including focus on both verbs, as shown in recent work by Lisa Selkirk[11]. The alternative parses, then, are expected to be marginal and dispreferred out of context. When sentences needing unusual intonation conditions are presented in written form and without contextual support, it takes some effort to come up with the discourse conditions that would make them acceptable. In contrast to (51) to (53), the (b), (c), and (d) examples of (47) to (50) do not need special intonation conditions or heavy objects to be judged acceptable. This suggests that they do not have to rely on marginal Heavy Noun Phrase Shift or Right Node Raising parses, but allow fully acceptable V-V-conjunction parses at PF, with one of the conjuncts being a compound verb. It seems, then, that in English, particles do indeed differ from adjectives in being able to form PF-visible compound verbs. We now seem to have the argument we were after: English *open* can be optionally parsed as a verb particle. The fact that *open* combines with transitive and unaccusative verbs, then, does not undermine the generalization that adjectival resultatives are impossible with transitive and unaccusative verbs.

Let me summarize what this section has accomplished. I have been building a case in favor of a raising analysis for all adjectival resultatives. A raising analysis for adjectival resultatives is attractive since it automatically accounts for the tight connection between direct objects and resultatives. The adjective in a resultative construction is predicated of the verb's direct object, because the adjective's argument has become that very same direct object. It has moved out of the projection of the adjective into the projection of the verb. It could only do so because the verb didn't have a direct object of its own. Such an analysis predicts that only verbs that have unergative uses can appear in this construction. Transitives and unaccusatives are barred. Attractive as it may be, we saw that the proposed raising analysis faced a long and frightening list of apparent counterexamples, even after setting aside

[11] . Lisa Selkirk personal communication.

directional constructions, which require a different analysis[12]. I examined the problem cases one by one. I argued that in some cases, what looked like an adjective could be parsed as an adverb. In other cases, an apparently transitive or unaccusative verb turned out to be unergative or had at least some unergative uses. And in at least one case, we saw that an adjective might have crossed over into the particle domain. The results I obtained for German and English should make us all skeptical about reports of transitivity or unaccusativity from lesser known languages. You need to apply complicated diagnostics to identify those properties.

There are still a number of issues that have to be attended to for the proposed analysis to be even remotely plausible. The most pressing one has to do with Carrier and Randall's objection to the idea that in resultatives like those in (57) the verbs *water* and *wipe* are used intransitively, and that, consequently, the surface direct objects are not semantic arguments of those verbs.

(57) a. The gardener watered the tulips flat.
b. The butler wiped the table clean.

For 57(a), we want to derive that the tulips became flat as the result of having been watered, and 57(b) should be shown to imply that the table became clean as a consequence of having been wiped. In the following section, I will argue that those inferences follow from the semantics of resultative constructions.

4. Interpreting resultative constructions

I want to begin the semantic investigation of adjectival resultatives by looking at our old teapot example, which is a good starting point, since in that case, nobody would claim that *the teapot* should be an argument of *drink*:

[12] . In Rappaport Hovav & Levin (2001), the authors retract the Direct Object Restriction, prematurely, I think. The apparent counterexamples mostly involve directionals.

(58) Die Teekanne leer trinken
The teapot empty drink
'Drink the teapot empty'

Resultative constructions like (58) are causative constructions[13]. They are "concealed causatives", though, in the terminology of Bittner (1999), since there is no visible carrier of causative meaning. All we seem to have in (58), for example, is an adjective, an intransitive verb, and a DP. Dowty (1979) proposed that the causal relation in concealed causatives is introduced by a construction specific interpretation rule working in tandem with a syntactic rule combining a transitive verb with an adjective to produce a verb-adjective compound. More recent work on semantic composition has done away with construction specific interpretation rules in favor of a very restricted set of general composition principles that apply freely. We have to explore the question, then, whether resultatives are likely to involve a freely available composition principle that introduces a causal relation. To have an example to look at, let us try to build up the meaning of (58). Here is the beginning of a derivation within a system of indirect interpretation, where a translation function T assigns expressions of an extensional typed λ-calculus to expressions of natural languages:

1. T(*trinken*) = λe_s[action (e) & drink(e)]
2. T(*die Teekanne*) = the teapot
3. T(*leer*) = $\lambda x_e \lambda s_s$[state(s) & empty(x)(s)]
4. T((*die Teekanne*) *leer*) = λs_s[state(s) & empty(the teapot)(s)]
   From (2), (3), by Functional Application.

In the λ-calculus used here, variables of type e (in this case just "x") range over individuals, variables of type s ("e" and "s") range over eventualities, including events proper and states. I have used the variable "s" (not to be confused with the type s) as a convenient way to remind us that we are dealing with states. Available composition operations include

[13] . See e.g. Lakoff (1972), Dowty (1979). Dowty (1979) is the classic work on causatives in the formal semantics tradition. Parsons (1990) discusses causatives within an event semantics. Bittner (1999) is a recent study in cross-linguistic semantics.

Functional Application, Predicate Abstraction, and conjunction operations for predicates, including Event Identification. The computation displayed here catches the syntactic derivation at a stage where the direct object *die Teekanne* is still within the projection of the adjective *leer*. The denotation of the AP *die Teekanne leer* is a property of states that is true of any state that consists in the teapot's being empty. In order to compute the denotation of the VP *die Teekanne leer trinken*, the denotation of the AP, which is a property of states, and the property of being a drinking action have to be combined. If we try to do this via Event Identification, we will end up with the empty property, and the computation will crash. There is no eventuality that is both a state and an action. Following the spirit of Bittner (1999), we might salvage our semantic computation by positing a type shift that allows a property of states to combine with a property of events by introducing a causal interpretation. Since an operation that turns adjectival roots into the corresponding causatives is independently needed to derive the meanings of verbs like *flatten*, *blacken*, and so on, let us assume (at least temporarily) that there is a type shifting operation that maps properties of states into the denotation of the corresponding causative. Within the present framework, this type shifting operation would correspond to a freely available composition operation that maps properties of states into properties of events proper. Not fussing about the distinction between presuppositions and truth-conditional content, we might consider the following shift:

(59) Causative Shift

$$\underset{\langle st \rangle}{P} \quad \Rightarrow \quad \lambda e_s \, \exists s_s [\text{state}(s) \,\&\, \text{event}(e) \,\&\, P(s) \,\&\, \text{CAUSE}(s)(e)]$$

The predicate 'CAUSE' in (59) will have to do the main work. 'CAUSE' is meant to stand for a causal relation. Which one? It doesn't have to be the same relation as the relation expressed by the English verb *cause*, a fact discussed by many writers on the topic[14]. Nor does it have to be the same relation as the one expressed by *make*. Overt causatives like *make* or *cause* express what is usually referred to as 'indirect causation', a relation that allows for

[14] . The (1986) postscript to "Causation" in David Lewis' Philosophical Papers discusses some important differences between the 'CAUSE' needed here and English *cause*. See also Dowty (1979) and Bittner (1999).

possibly very long causal chains connecting the mentioned cause to the mentioned effect. The causal relation in concealed causatives is always direct, a generalization that Bittner (1999) states as follows:

(60) **Bittner's Generalization**
If a causal relation is syntactically concealed (only its arguments are overtly expressed), then it is semantically direct (no intermediate causes).

What does it mean that there are no intermediate causes? A promising starting point for a possible answer comes from an observation in Carl Ginet's (1990) book *On Action*[15]. Adapted to our teapot example, Ginet's observation is that we have to distinguish between a drinking action that causes the teapot to be empty, and a drinking action that is an event of causing the teapot to be empty. Put more generally, the distinction is between an event c that causes an effect e and an event c that is a causing of an effect e. In the second case, e is a part of c, in the first case, it is not. Here is an illustration. Suppose my drinking all the water in the well causes your teapot to be dry. The reason is that, without any water left, there just isn't any more tea to be had. This is a case of indirect causation. In such a situation, I did not drink your teapot dry. In Ginet's terms, my action was an event that caused your teapot to be dry. It was not an event of causing your teapot to be dry. Not every part of the causal chain leading from what I did to the deplorable state of your teapot was part of my drinking activities. There was that extra stretch – the part of the chain that led from the emptiness of the well to the dryness of your pot that is not part of my drinking. Let me make this more precise.

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[15] . "…it is natural to think that what is designated by a phrase of the form "S's causing E" is an event or episode that includes E as a part, as well as the causal relation between E and whatever S did to cause E; so S's causing R to become offended (by voting against a proposal) must be distinct from S's voting against a proposal, because the first has a part, R's becoming offended, that the second lacks." Ginet (1990), p. 59. On p. 60, Ginet denies explicitly the following identity statement from Davidson (1980), p. 58: "Doing something that causes a death is identical with causing a death."

We might start with a primitive notion of causation between events, or else adopt the one in Lewis (1973), and see where it takes us. We would begin with a definition of causal dependence. Let e and c be two distinct actually occurring events in our universe of events E[16]. Then e depends causally on c just in case e wouldn't have occurred if c hadn't. In this first step, then, causal dependence is reduced to counterfactual dependence. I will not introduce the machinery needed to define counterfactual dependence. An intuitive understanding will do for our purposes, and the technical details can be found in Lewis' work. Still following Lewis, the relation 'e is caused by c' is defined as the transitive closure of the relation of causal dependence[17]. The causation relation we are after is the inverse of the relation 'e is caused by c'. There are now certain convex subsets of E that are linearly ordered by the causation relation we have just defined. Those sets are causal chains. All members of a causal chain are connected by the causation relation, then. By requiring causal chains to be convex, we make sure that no relevant intermediate causes can be skipped. More formally, the requirement says that whenever there are events c and e in a causal chain C, and there is an event c' in E that is caused by c and causes e, then c' must be in C as well. Since E only contains contextually relevant events, irrelevant intermediate causes can be ignored. A maximal element of a causal chain C is an event in C that does not cause any of the others in C. Likewise, a minimal element of a causal chain C is an event in C that is not caused by any of the others in C. If causal chains have maximal or minimal members at all, they always have unique ones. We now have the main ingredients we need.

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[16] . The definition of causal dependence I am about to present is not quite the one Lewis gives as his definition of causation. My definition only defines causation as a relation between actual events. This simplification seems to be justified for our purposes.

[17] . See Lewis (1973) and the postscript in Lewis (1986) for why causal dependence and causation have to be distinguished. In a nutshell, the situation is as follows: Causal dependence is defined as counterfactual dependence. Counterfactual dependence is not a transitive relation, but causation is. Here is a definition of the notion 'transitive closure': Where R is a binary relation, then Trans(R) is the smallest set satisfying (i) and (ii): (i) R is a subset of Trans(R), (ii) if <a,b> and <b,c> are in Trans(R), then <a,c> is, too.

(61) a. **Events of causing other events**
An event c is an event of causing an event e iff c is the sum of all the members of some causal chain with maximal element e.

b. **Events that cause other events**
An event c is an event that causes an event e iff c is the minimal element of some causal chain with maximal element e.

61(a), rather than 61(b), gives us the meaning of 'CAUSE' according to what I am proposing. To see what the definition does, let us go back to the type-shifting rule (59). The expression 'CAUSE(s)(e)' appearing there is intended to mean that e is an event of causing s, and not that e is an event that causes s. We can now continue with the abandoned computation from above, and apply Causative Shift to line 4. Here is the result:

5. $\lambda e_s \exists s_s$[state(s) & event(e) & empty (the teapot)(s) & CAUSE(s)(e)]

Causative Shift has mapped the property of states that is true of any state that consists in the teapot's being empty into the property of events that is true of any event that is an emptying of the teapot – an event of causing the teapot to be empty, that is. Applying Event Identification to step 5 yields the denotation for the VP in our teapot example:

6. T (((*die Teekanne*) *leer*) *trinken*) =
$\lambda e_s \exists s_s$ [action(e) & drink(e) & state(s) & empty(the teapot)(s) & CAUSE(s)(e)]

The denotation of (58), then, is the property of actions that is true of any action that is a drinking and is also a completed event of causing the teapot to be empty. Here is the important part: A drinking event is identified with a completed event of causing the teapot to be empty. We can now reason that if an action of drinking is identical to a completed action of causing the teapot to be empty, then what was drunk is bound to be the content of the teapot. A similar piece of reasoning can be applied to examples like (61):

(61) The butler wiped the table clean.

According to the analysis of resultatives I have just proposed, the VP of (61) describes a property of actions that is true of any action that is a wiping activity and is also a completed action of causing the table to be clean. We can again infer that if a wiping activity was identical to a completed action of causing the table to be clean, then what was wiped was bound to be the table. This is how a raising analysis of sentence (61) can account for the inference that the table was wiped, even though the DP *the table* does not start out as an argument of *wipe*. The semantics delivers that result free of charge, given certain plausible assumptions about the extensions of verbs like 'drink' or 'wipe' which I will address shortly. The key concept was the subtle distinction between an event that causes the table to be clean and an event of causing the table to be clean. I suggested that the linguistically significant difference between direct and indirect causation is closely related to that important but easy to overlook distinction that Carl Ginet drew attention to.

Before moving on, I want to reflect on what we have to assume about the extension of predicates like *drink* or *wipe* for my account of resultatives to work out. Take again the example where my drinking all the water in the well causes your teapot to be dry. We saw earlier that in such a situation, I did not drink your teapot dry. This is a clear judgment, which should come out right on our analysis. Suppose e is my drinking all the water in the well, and s is your teapot's being dry, or just a part of your teapot's being dry, the very beginning part, say. Then causal chains leading from e all the way to s are not in the extension of the predicate *drink* under normal assumptions. For such causal chains to be in the extension of *drink*, the state s would have to be part of a drinking event. Borrowing imagery from Parsons (1990), s would have to overlap the culmination part of a drinking event, which is not the case in our scenario. To have another example, take my walk to the post office this morning. That walk consisted of a development part, the walking, and a culmination part, which we can think of as an initial part of the state of my being at the post office. Likewise, the development part of your wiping the table clean is the wiping activity, while the culmination part is an initial segment of the state of the table's being clean that your action brought about.

All of this fits well with what others have said about resultatives. Following Levin and Rappaport Hovav (1995), Wechsler (1997), and Rappaport Hovav and Levin (2001), Rothstein (2001) proposes a semantic analysis of resultatives based on the intuition that "what resultatives do is give information about the state initiated by the culmination point of an event" (p. 158 f.). An essential feature of Rothstein's account, which is preserved in mine, is that the directness of the causal relation in resultatives crucially depends on what event-plus-state complexes we are willing to admit to the extension of a simple activity predicate like *drink*[18]. *Drink* does not require the events it describes to culminate, nor does it impose any conditions on culmination parts. But this does not mean that *drink* cannot have event-plus-state complexes in its extension. It is those event-plus-state complexes that constrain the resultatives it might combine with. On such an approach, the notions of 'direct' and 'indirect causation' that are reflected in the causative vocabulary of natural languages are intimately tied to the extensions of predicates. The direct causation interpretation of adjectival resultatives, for example, is produced by identifying the events described by the participating verb with causal chains leading to a state described by the adjective. Which of those causal chains qualify as 'direct' is determined by the denotation of the verb. 'Directness' is not an inherent property of the causal chains themselves, then.

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[18]. Rothstein (p. 159) has a composition operation, Resultative Conjunction, which construes the events described by a resultative construction as the set of sums consisting of a state s described by the adjective and an event e described by the verb such that the culmination part of e is part of s. Given the notion of 'causal chain' I introduced earlier, we can define the notion 'culmination part of' as follows:

(i) A state s is a culmination part of an event e iff e is the sum of some causal chain with maximal element s.

(ii) A state s is the culmination part of an event e iff s is a culmination part of e and for all s': if s' is a culmination part of e, then s' ≤ s.

Since events do not determine unique causal chains they are the sums of, an event can have more than one culmination part, even if any given causal chain can only have one maximal element.

5. An affix instead of a type shift

The semantics for resultatives I presented in the last section yields the right result and meets Carrier & Randall's challenge, but, as is, it still has a blemish that it shares with Bittner's analysis. The Causative Shift operation introduces an unorthodox kind of composition principle. Intuitively, Causative Shift contributes 'lexical meaning'. Restrictive systems of composition principles or type shifts shouldn't include operations of this kind. A plausible constraint for possible semantic composition operations or type shifts is that they be 'logical' or 'topic neutral' in the sense of van Benthem (1986). Causative Shift is not a topic neutral or logical operation and is therefore an unlikely candidate for a semantic composition principle or type shift. If there is no composition principle like Causative Shift, and there is no overt lexical item contributing the causal relation in resultatives, the only remaining option seems to be that the causal relation in resultatives must be introduced by an invisible lexical item. Minimally, such an item could be an unpronounced morpheme consisting of an interpretable feature [cause]. If it is to have the same semantic effect as Causative Shift, [cause] should have the following denotation:

(62) $T([\text{cause}]) = \lambda P_{<st>} \lambda e_s \exists s_s$ [state(s) & event(e) & P(s) & CAUSE(s)(e)]

According to (62), [cause] introduces an event argument, but crucially, doesn't introduce any other argument, a causer argument, for example. It is clear that it shouldn't do so if it is to be used in resultative constructions. Interestingly, Liina Pylkkänen has argued that causative heads should never introduce causer arguments (Pylkkänen 2002). As Pylkkänen points out, her claim might initially seem implausible since it appears to be a universal fact that causative verbs have causer arguments that the non-causative stems they are derived from lack. It would thus be natural to assume that causatives are derived via the addition of a head that also adds a causer argument. However, Pylkkänen shows in her dissertation that the apparent universal generalization is wrong. Causativization does not always add a causer argument. According to Pylkkänen, "what universally distinguishes causative verbs from their non-causative counterparts is a syntactically implicit event argument ranging over causing events. Specifically, I will argue that all causative constructions involve the head CAUSE which combines with non-causative predicates and introduces a causing event to

the semantics…" (p. 75). As for causer arguments, they would now be introduced by independent heads, [active] voice heads, for example.

If the causative interpretation in adjectival resultatives is brought about by an unpronounced affix, we might be able to understand certain constraints for those constructions. In his (1984) dissertation, Nigel Fabb observes that the *-ing* participles of experiencer verbs have all the properties of adjectives, except that they can't appear in resultatives:

(63) a. * I cooked it disgusting.
c. * I brewed it soothing.
d. * She knocks herself frightening.
e. * He dances himself embarrassing.

Similar cases, including some involving the *-ed* participle suffix, are reported in Simpson (1983), Smith (1983), and Carrier and Randall (1992)[19].

(64) a. * The maid scrubbed the pot shined / shining.
b. * The jockeys raced the horses sweating.
c. * She knocks herself frightening.
d. * The chef cooked the food blackened / charred.
e. * The joggers ran themselves sweating / exhausted.
f. * The kids laughed themselves sickened.
g. * The chef cooked the kitchen walls blackened.
h. * The tourists walked their feet blistered.

If [cause] is carried by a derivational affix, we expect that affix to be submitted to constraints that go beyond mere interpretability[20]. Derivational affixes can only attach to bases that satisfy certain conditions, which may be phonological, morphological, syntactic or semantic in nature. English derivational affixes, for example, have been claimed to fall into two

19. All examples in (64) are quoted from Carrier and Randall (1992), p. 184.

20. Pesetsky (1995) pioneered investigations based on reasoning of this kind.

classes, referred to as "class I" and "class II" in Siegel (1974). Selkirk (1982) distinguishes between Root and Word affixes. More recently, Jennifer Hay proposed a "complexity based" account for the ordering of derivational affixes (Hay 2000, Hay and Plag 2004). The basic idea behind Hay's analysis is that a derivational affix that can be easily "parsed out" should not occur inside one that cannot. Such an analysis seems to imply that unpronounced derivational affixes should never occur outside of pronounced ones. Unpronounced derivational affixes are bound to be the best possible instances of derivational affixes that cannot be "parsed out". If that is so, the ungrammaticality of (63) and (64) follows. If [cause] is carried by an unpronounced derivational affix, it should not be able to appear outside of the suffixes *–ing* and *–ed*, which are highly separable – if indeed they are derivational affixes at all. If *–ing* and *–ed* are not derivational affixes, but pieces of inflection, a derivational affix like [cause] is even less expected to attach outside of *–ing* or *–ed*. Whatever the right account of affix ordering may turn out to be in the end, a morphological explanation for the ungrammaticality of (63) and (64) would not be expected if the causal interpretation of adjectival resultatives was brought about by Causative Shift. Such a type shift would only see the semantic types of the input adjectives. As long as the denotations of the adjectives in (63) and (64) are of the same type as the denotations of simple adjectives (admittedly not a necessary assumption), Causative Shift would not be able to distinguish between good adjectival resultatives and the cases in (63) and (64). Even if we tried to constrain the application of Causative Shift, we would still have to explain why type shifting operations should be constrained in that particular way. On the other hand, if [cause] is a feature carried by an affix, constraints of the kind exemplified by (63) and (64) are expected to follow from independently needed accounts of the ordering constraints for affixes.

The feature [cause] whose meaning is defined in (62) does not only appear in adjectival resultative constructions. In English, it seems to be responsible for turning adjectives into verbs, without outward sign of the change, as in 65(a), or with the help of a pronounced suffix, as in 65(b)[21]:

[21] . See Levin (1993), 28 and Levin and Rappaport Hovav (1995), 95 f. for longer lists.

(65) a. *Empty*, *dry*, *clean*, *cool*, *dim*, *dirty* ….
b. *Flatten*, *shorten*, *blacken*, *sweeten*, *stiffen*…

If there are pronounced or unpronounced affixes that carry [cause] and are thus capable of turning stative roots into eventive predicates, an important question pops up immediately. Why is 66(a) grammatical, but 66(b) is not?

(66) a. The gardener watered the tulips flat.
b. * The gardener watered the tulips flatten.

If one and the same feature [cause] is involved in adjectival resultatives like 66(a), as well as in verbal causative constructions like 66(b), why do we see a morphological difference in the shape of the two causatives? Here, too, a crucial ingredient for a possible answer might come from the work of Liina Pylkkänen. Pylkkänen (2002) argues that while causative features and voice features are different features, they may be "bundled together" in some languages, and thus get spelled out together. If that is so, the suffix *-en* of *flatten* might not merely spell out the feature [cause]. It might spell out a bundle of features, including [cause] and a voice feature, which could be [active] or [non-active] in this case, thus generating transitive and intransitive alternants. That both transitive and intransitive verbs have a voice feature is in line with Alexiadou and Anagnostopoulou (2004, 119), who report that there is a recent trend in the literature to assume voice inflection to be present with transitives and intransitives. Representatives of this trend are Harley (1995), Collins (1997), and Embick (2004). That even the intransitive alternants of the verbs in 65(a) and (b) are causatives is argued in Chierchia (2004, circulated since 1989) and Levin and Rappaport Hovav (1995). The events described by inchoatives and anticausatives can then be seen as internally, rather than externally caused in the sense of Levin and Rappaport Hovav. The intransitive VP in the sentence *The sauce thickened*, for example, would describe events of causing the sauce to become thick(er), where the prominent cause for that event can be (but doesn't have to be) linked to properties inherent in the sauce itself. A commitment to a prominent external cause like an agent or a force of nature would be contributed by [active] voice. Chierchia's and Levin and Rappaport's proposals have the interesting consequence that the commonly

posited BECOME operator becomes superfluous in the decomposition of inchoatives, causatives, and anticausatives. Those three types of verbs are all causatives. They differ with respect to voice. It is quite plausible, then, to assume that the suffix *–en* of the verbs in 65(b) spells out [cause] and a voice feature together in both the transitive and the intransitive alternants. What we would still want to know, however, is why the adjectival root in resultative constructions can combine with an affix carrying [cause], but not with an affix carrying a bundle consisting of [cause] and a voice feature. What is so special about voice features?

In contrast to [cause], voice features are inflectional features according to Kratzer (1996). It might be, then, that for some still unknown reason, an adjectival root + [cause] compound is prevented from putting on any kind of inflectional morphology in a resultative construction. Why should that be so, however? A possible clue is provided by an important observation of William Snyder (Snyder 1995, Snyder 2001). Snyder found that there is a correlation between the availability of resultatives and the availability of productive root compounds, both across languages and in the course of language acquisition. In the following section, I will try to connect Snyder's observation to an explanation for why sentences like 66(b) are so bad.

6. Resultatives and serialization

I want to begin this section by reflecting one more time on the stepwise derivation of adjectival resultatives. At some point in the syntactic derivation, we might have built a structure of the following kind (neglecting any kind of DP-movement), going through different stages in the spirit of Chomsky (2001):

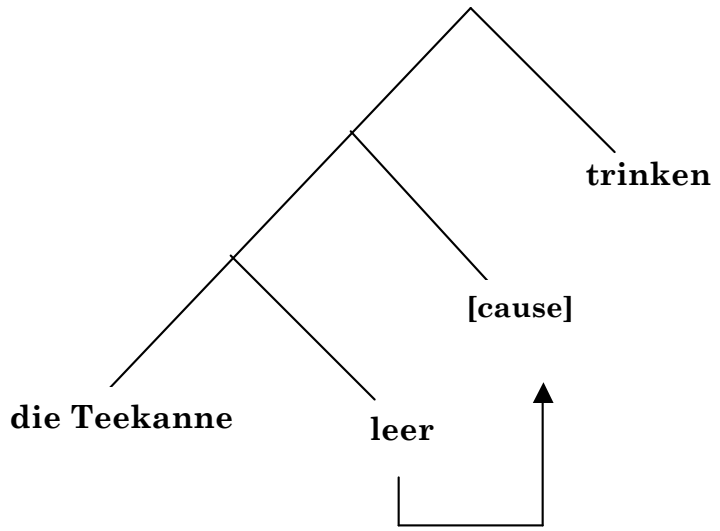

Figure 2

Stage 1	Merge *leer*	
	Merge *die Teekanne*	
	Interpretation:	Combine the translations of *die Teekanne* and *leer*: λs empty(the teapot)(s)
Stage 2	Merge [CAUSE]	
	Interpretation:	Combine the translations of [CAUSE] and its sister node: λe∃s [empty (the teapot)(s) & CAUSE(s)(e)].
	Head movement:	[cause] attracts *leer* to satisfy its affixal needs.
Stage 3	Merge *trinken*.	
	Interpretation:	Combine the translations of *trinken* and its sister node: λe∃s [empty (the teapot)(s) & drink(e) & CAUSE(s)(e)].

In stage 1, a head is combined with an argument. The result in turn provides an argument for [cause]. The root *leer* can now incorporate into [cause] to satisfy that feature's need for affixation. The merging pattern is disrupted in stage 3, where a head is introduced that

embeds a constituent that is not its argument. This, I suspect, is a problem, even though it does not lead to uninterpretability. Let me explain why.

Technically, the structure we have built looks like the closest analogue to a serial verb construction we might find in languages like English or German. Two independent eventive lexical predicates are piled on top of each other: *trinken* and *leer*+[cause]. If we had chosen to continue the derivation beyond stage 3, the two predicates would have had to share a subject and all pieces of verbal inflection. Since there is no overt marker of coordination or subordination, the standard criteria for serial verb constructions are satisfied (Déchaine 1993, Collins 1993, 1997). Interestingly, Gruber (1990), Collins (1997), Gruber & Collins (1997), Nishiyama (1998), have all argued that there is a fundamental structural similarity between serial verb constructions and V-V compounds: V-V compounds of the kind we find in Chinese, Japanese, or ≠ Hoan, for example, are syntactically derived from serial verb configurations, and serial verb configurations of the kind found in the Kwa languages involve compounding in the covert syntax. That is, in a serial verb construction with two verbs, for example, the lower verb inaudibly incorporates into the higher verb. If those authors are right, we can assume that whatever forces compounding for serial verb constructions can be assumed to force compounding for adjectival resultatives as well. What might that force be, though?

One possibility I can think of is that there might indeed be something illicit about stage 3 in the derivation above: A second eventive head is merged that cannot take its sister constituent as its argument. Complex predicate formation may be required, then, to eliminate an illicit embedding configuration via 'clause union'. In our case, overt or covert head movement adjoins *leer*+[cause] to the left of *trinken*. There are no semantic consequences of that step. While still speculative, the 'elimination of an illicit embedding configuration' hypothesis fits well with recent work by Marcin Morzycki (Morzycki 2001, forthcoming). Morzycki has argued that most adverbial phrases are not really modifiers, but arguments of functional heads. According to Morzicki's program of Mediated Modification, the apparent modifier interpretation of many different kinds of adverbial phrases is in fact the semantic contribution of the functional heads whose specifier positions those adverbials occupy (Cinque 1999). Morzycki's work has the consequence that locatives, as well as temporal,

manner, and other types of adverbials, are all arguments of specialized heads. From this perspective, the configuration created in stage 3 of the derivation is highly anomalous. When the projection of a head is built, the creation of head argument configurations seems to be the driving force: Merge a head a, give it an argument b. In the next stage, merge a head c that takes a+b as an argument. Then continue by merging a head d that takes a+b+c as an argument, and so on. If there is a violation, overt or covert head movement offers a remedy by bringing about 'clause union'. Languages differ as to whether or not they unite the clauses overtly. Suppose that some such story can be told. How might that story help us explain the ungrammaticality of 66(b)?

Baker (1996, 2003) mentions and uses a generalization that he labels "Li's Generalization" (Li 1990) or "Proper Head Movement Generalization":

(67) The Proper Head Movement Generalization
It is impossible to move from a functional category into a lexical category.
Baker (2003), 306.

As is, (67) is a mere generalization, and we would eventually want to have an explanation for it. For the time being, however, let us suppose that the generalization is true and not worry about how to make it follow from more general principles[22]. Turned into a constraint, (67) excludes 66(b) on the assumption that the suffix *–en* of *flatten* spells out [cause] and a voice feature together. Supposing that the features are spread out at the relevant stage of the

[22] . Following up on a suggestion by David Lebeaux (p.c. to Mark Baker, reported in Baker 2003, 306), we might consider the possibility that the PMHG follows from an architecture where the lexical part and the functional part of a head's extended projection are built separately, and are fused at some point in the derivation (Lebeaux 1988). Movement of lexical heads into functional heads would now be part of the process that fuses the two types of structures after the lexical part of the projection has been inserted into the functional part. Lebeaux's proposal is attractive since the PMHG would fall out from the very architecture of the syntactic engine.

derivation, we are committed to the following head movement chain when deriving 66(b), assuming that we are dealing with the intransitive version of *flatten*:

(68) Step 1 FLAT ⇒ FLAT+[cause]
Step 2 FLAT+[cause] ⇒ FLAT+[cause]+[non-active]
Step 3 FLAT+[cause]+[non-active] ⇒ FLAT+[cause]+[non-active] + WATER

In step 2, FLAT+[cause] adjoins to a functional head, the voice head [non-active]. In violation of the Proper Head Movement Generalization, the head created by step 2 adjoins to a lexical head again in Step 3.

Assuming that [cause] is a derivational affix, no problems are expected to come up in the derivation of adjectival resultatives of the kind we have been examining. In those constructions, simple stative roots that are commonly used to build adjectives have chosen to become eventive by attaching the unpronounced derivational affix [cause]. The result is a causative with the looks of an adjective.

In section 3, I argued that a raising analysis is a possibility for all adjectival resultatives, by removing major apparent counterexamples. I have now spelled out such an analysis. What is still missing, though, is an explanation for why adjectival resultatives must have a raising analysis. What is it that forces us to project a raising structure, and thus prevents us from using transitive or unaccusative verbs in adjectival resultatives? Why couldn't a language learner come up with a parse of the following kind, for example (Bowers 1997, 2001[23])?

[23] . Bowers posits a Pred(ication) head on top of the adjective, though, rather than [cause]. He argues for a control structure for transitive resultatives, and a raising structure for intransitive resultatives.

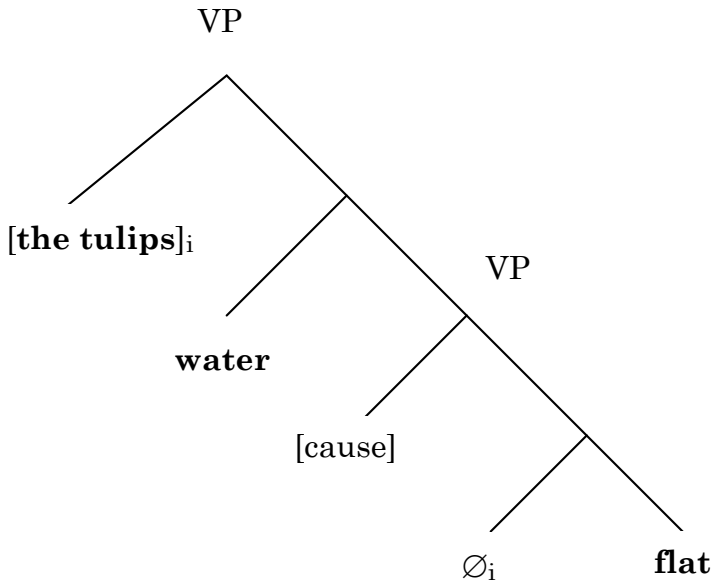

Figure 3

In the structure of figure 3, the argument given to the adjective *flat* is an unpronounced pronoun that is anaphorically related to the verb's direct object, *the tulips*. In this way, the adjective and the verb can share an argument. There are requirements for the pronoun in this configuration. It shouldn't need case, for example, since there is only one objective case available. That case should go to *the tulips*. The pronoun posited in figure 3 must be *PRO*, then, rather than *pro*, which needs case like any overt pronoun. But *PRO* doesn't really fit the bill either. The known occurrences of *PRO* (primarily control infinitives in English) all occur in environments where a fair amount of functional structure intervenes between it and its antecedent. On accounts such as Finer (1984, 1985), Borer (1989) and Hale (1992), that functional structure is essential. It includes agreement morphology, which is responsible for establishing the anaphoric relationship between *PRO* and its antecedent: *PRO* enters a local agreement relation with an agreement head, which in turn enters a local agreement relation with the agreement head of the 'controlling' DP. There is no direct anaphoric relation between *PRO* and its 'controller', then. An apparently non-local anaphoric relation between two DPs is produced by a local anaphoric relationship between two inflectional heads. This type of account has interesting consequences beyond control infinitives. Finer originally developed it for switch reference phenomena. In Kratzer (1998) I invoked the same

agreement mechanism for the analysis of sequence of tense, *de se* attitude reports, and apparent bound variable interpretations of indexicals. If this is the right way of thinking about *PRO*, the structure in figure 3 is ruled out for principled reasons. *PRO* needs agreement morphology to identify its features via an anaphoric relationship with a functional head. However, if the adjective *flat* projected agreement morphology, the constraint behind the Proper Head Movement Generalization would block clause union via incorporation, hence the derivation would crash in stage 3. A raising analysis is forced, then. A control analysis is not an option. The constraints for the participating verbs follow.

7. Resultatives across languages

How come not all languages have resultatives? Famously, the Romance languages don't, for example. What is it that German and English can, but Romance languages can't do when it comes to resultatives? On the account of adjectival resultatives that I have been developing, a root that we usually associate with adjectives managed to become eventive, crucially without the help of any inflectional morphology. Why can't the same happen in Romance? Take French. In French, as in other Romance languages, both attributive and predicative adjectives must have agreement morphology. Manner adverbs usually appear with the suffix *–ment*, but there are also a few simple 'adjectives' that have adverbial uses, including *court* ('short'), *doux* ('sweet'), *haut* ('high'), and *bas* ('low') (Grevisse 1964, 311). Inflectionless adjectival roots are very rare, and there do not seem to be any adjectival resultatives. Here are two apparent exceptions from Legendre (1997, 46 f.):

(69) a. Pierre a peint les murs en blanc.
Pierre has painted the walls in white
Pierre painted the walls white.

b. Il lui a coupé les cheveux court.
He him/her has cut the hair short.
He cut his/her hair short.

In 69(a), the 'adjective' appears after a preposition, which suggests that it is used as a noun. 69(b) is one of those resultative constructions where the apparent 'adjective' can be parsed as an adverb ('How did he cut his hair?'), and, as expected, *court* does indeed have purely

adverbial uses[24]. What is highly relevant for my plot is that when French uses adjectives within compounds, the adjectives like to be fully inflected, thus confirming Snyder's generalization[25]:

(70) a. Union chrétienne - démocrate
Union Christian (fem.sing.) – Democratic (sing.)

b. Les partis sociaux - démocrates
The parties social (masc.pl.) - democratic (pl.)

c. Une jeune femme sourde - muette
A young woman deaf (fem.sing.) - mute (fem.sing.)

d. Les dames courtes - vêtues
The ladies short (fem. pl.) - dressed (fem. pl.)
The short-skirted ladies

e. Gilberte Swann (nouvelle riche, snob)
Gilberte Swann (new (fem. sing.) rich, snob)

f. Herbes aromatiques fraîches cueillies
Herbs aromatic (fem. pl.) fresh (fem. pl.) picked (fem. pl.)
Freshly picked aromatic herbs.

In German A-A compounds only the second adjective can be inflected. Inflecting the first one, too, would result in severe ungrammaticality. We see a solid difference between German and French, then. Except for a few frozen cases, French adjectival roots cannot stand alone. They even inflect in compounds. In contrast, German adjectival roots appear bare in all predicative constructions, as manner adverbs, and within compounds.

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[24]. Grevisse (1964, p. 311) quotes A. France's example "Ses idées s'arrêtaient court" ('His ideas stopped short'), a clearly adverbial use of *court*.

[25]. Grevisse (1964). All examples in (70) are the result of a Google search. In some cases, uninflected forms of the first adjective came up, too: *Cette fille sourd-muette* ('This deaf-mute girl'). *Des jeunes filles court-vêtues* ('Short-skirted girls'). That last form of *court-vêtu* is the one sanctioned by Grevisse (p. 318), who refers to a 1901 decree of the French Minister of Education.

Suppose, then, that in contrast to German, French adjectives are fully inflected at the starting point of a syntactic derivation. There would never be a stage, then, where they appear without inflection. This would make it impossible to merge [cause] in stage 2 above. The derivational affix [cause] could not satisfy its affixal needs, since it could not attach outside of inflectional morphology. As for German adjectives, there would only be roots at the beginning of a syntactic derivation[26]. Those roots could be inserted into different types of functional structure, then. Combined with nominal inflection, they could modify nouns. Combined with certain verbal functional heads, they could become adverbs, as Morzycki has proposed. With the help of a copula, they could hook up with verbal inflectional morphology. After attaching [cause], they could participate in serialization, or become fully inflected causative verbs. German adjectival roots can in fact do all those things. The possibilities for French adjectives are much more limited. They seem to be stuck with what looks like nominal inflection. That inflection is even present in adverbial forms ending on the suffix *–ment*, which attaches to the feminine form of adjectives, as in *heureusement* ('fortunately'), *légèrement* ('slightly'), etc. The situation in some Italian dialects is even more dramatic. Adverbs have basically disappeared in southern Italian dialects south of the Gaeta-Rieti-Termini line. Inflected agreeing adjectives are used instead:

(71) I ligna sicchi addúmanu bòni
The (masc. pl.) wood dry (masc. pl.) burn good (masc. pl.)
'Dry wood burns well.'
Rohlfs (1969), 243. Glosses and translation are mine.

More cross-linguistic research is needed to follow up on the consequences of the suggested difference between German and French (Romance). As emphasized by Catherine Fabricius Hansen (personal communication), Norwegian presents an interesting test case for bold and

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[26] . Marantz (1997) and Borer (2004) are constructional proposals in this spirit. However, what we seem to be seeing in French is, that the most radical form of syntactic constructivism might not always be realized. Also, the lack of productive verb serialization in Indo-European languages suggests that verbs in those languages might start their life in syntax with at least some piece of inflection.

(quite possibly) premature claims about the connection between resultatives and adjectival inflection. The following data come from Åfarli (1984, 33):

(71)	a.	Vi vaska golvet reint. We washed the floor clean.	Neuter agreement (obligatory)
	b.	Vi vaska rein(t) golvet. We washed clean the floor. We washed the floor clean.	Neuter agreement (optional)
	c.	Golvet er reinvaska. The floor is clean-washed. The floor is washed clean.	Compound

The good news is that Norwegian seems to use uninflected adjectives for overt incorporation, as illustrated in 71(b) and (c)[27]. The potential problem is covert incorporation. The agreement morphology we see in 71(a) and (b) would have to be assumed to be a mere PF-phenomenon that does not interfere with the covert incorporation of the adjective. This is not an impossibility, but without investigating the complete pattern of adjectival agreement in Norwegian, I feel I cannot proceed any further. For the time being, I let Fabricius-Hansen's challenge stand.

I have presented an analysis of adjectival resultative constructions that explains the peculiar cluster of restrictions they are submitted to. A verb and an adjective can only come together under very special conditions. First and foremost, the adjective has to find a way to become eventive. The suffix [cause] can help. Together with Event Identification, [cause] produces

[27] . For an interesting explanation for why the incorporated version should appear as *vaska rein* in 71(b), rather than *rein vaska*, as in 71(c), see Collins (2002). According to Collins, the order *vaska rein* would be produced by left-adjoining *vaska* to the first functional head above VP (my [active] voice, his *v*). The adjective *rein* could then in turn be left-adjoined to [active], and would thus end up sandwiched between *vaska* and [active]. In the adjectival passive construction 71(c), there is no voice, even if adjectival participles can be constructed in the syntax (see Kratzer 2000). Only *reinvaska* should be possible, then – *rein* can only incorporate into (that is, left-adjoin to) the verb.

a direct causation interpretation. The adjective's object needs case, and this prevents the verb from taking a direct object of its own. The adjective's object becomes the joint object of the verb-adjective pair. Being unergative, the verb can't embed the phrase projected by its adjectival mate. This forces clause union, and a complex predicate is born. Both parties have to pay a price, though. The verb can't be transitive or unaccusative. The adjective must be bare. That's in a nutshell the analysis of resultatives I have proposed.

I have used resultatives as a probe into the architecture of the syntax-semantics interface. Most importantly, the proposed analysis of resultatives generates expectations about serialization. In a serial verb construction, a stack of VPs is interpreted via successive applications of Event Identification. Consequently, there are tight constraints on what kind of verbs can participate in the construction. Most run-of-the-mill event descriptions are not compatible with each-other: I can laugh while dancing and move while sleeping, but no laugh can be a dance, and no sleep can be a move. On the other hand, a watering event can be an event of causing the tulips to be flat, and a drinking event can be an event of causing your teapot to be empty. As long as VPs can describe such causing events without the help of inflection, we should find causal interpretations in serial verb constructions. We saw that in German and English, the availability of an unpronounced derivational suffix [cause] seems to produce a marginal case of serialization. What other types of event identifications might be possible in principle? A walking event could be identified with an event that has a particular purpose, for example, like buying a refrigerator or talking to my boss. If VPs could describe such events without the help of inflection, we would expect to find serial verb constructions with purpose interpretations. We should be looking for inflectionless VPs with meanings corresponding to English *in order to* –infinitivals, then. More generally, the major constraints on verb serialization should be jointly determined by the operation of Event Identification and the expressive possibilities for bare VPs. I wished I knew more about what inflectionless VPs can mean in the languages of the world.

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