A Closer Look at the Unique Path Constraint Effect from the Point of View of Spatial Extension[*]

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1. Introduction

It has been observed that a single clause cannot describe change of state and change of location at the same time (Simpson (1983), Goldberg (1991, 1995), Levin and Rappaport (1995), Tortora (1998), Matsumoto (2006), among others.). On the basis of this observation, Goldberg (1991:368) formulates the Unique Path Constraint (henceforth, the UPC):

(1) **Unique Path Constraint**: if an argument X refers to a physical object, then more than one distinct path cannot be predicated of X within a single clause.

The UPC prohibits multiple expressions that denote distinct paths from co-occurring in a single clause. Goldberg argues that a result phrase and a path phrase may not co-occur in a single clause in (3) because the co-occurrence of them violates the UPC.[1]

(2) a. Sam kicked Bill black and blue.
    b. Sam kicked Bill out of the room.
(3) a. * Sam kicked Bill black and blue out of the room.
    b. * Sam kicked Bill out of the room black and blue.

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[1] Goldberg (1991:368) notes that the notion of a single path entails both of the following two things:

(i) X cannot be predicated to move to two distinct locations at any given time *t*.
(ii) The motion must trace a path within a single landscape.

Goldberg explicitly states that the UPC bans the co-occurrence of a change of state expression and a change of location expression in a single clause when the change of state and the change of location occur at the same time. As Yasuhara (2012a) argues, however, the formulation of the UPC on the basis of simultaneity is not adequate. Furthermore, Goldberg herself does not take the notion of simultaneity into account in her discussion of the examples in (4), which are apparently problematic for the UPC. For these reasons, I do not mention the notion of simultaneity in this paper.

(Goldberg (1991:368))

The result phrase *black and blue* in sentence (2a) exhibits change of state of the referent denoted by the object NP *Bill*. Likewise, the path phrase *out of the room* in sentence (2b) expresses change of location of *Bill*. Goldberg argues that the result phrase and the path phrase exhibit two distinct paths; the co-occurrence of the result phrase and the path phrase in a single clause violates the UPC, as in (3).

Although the UPC appears to be a mere generalization about the co-occurrence restriction on a change of state expression and a change of location expression in a single clause, it has a theoretically significant motivation. Yasuhara (2012a) argues that the UPC effect follows from the nature of event structure: Two distinct changes may not be involved in a single event.

However, the following examples, which are pointed out by many researchers (Goldberg (1995), Levin and Rappaport (1995), Matsumoto (2006), Okuno (2003)), appear to be problematic for the UPC:

(4) a. The butcher sliced the salami onto the wax paper.
b. Joey grated the cheese onto a serving plate.
c. Sam shredded the papers into the garbage pail.
(Goldberg (1995:171))
(5) a. The cook cracked the eggs into the glass.
b. Daphne shelled the peas onto the plate.
(Levin and Rappaport (1995:60))
(6) Kelly broke the branch off the tree. (Rappaport and Levin (1998:123))

All of these sentences include the matrix verbs denoting change of state of the objects, which can be considered as paths in terms of change of state.[2]

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[2] Goldberg (1995, 2001) argues that verbs of change of state are compatible with path phrases when the sentence involves intentionality of an agent:

(i) Paths of motion may be predicated of arguments of result verbs if the activity designated by the verb is associated with a conventional scenario in which the incidental motion can be construed as an intended and predictable effect.
(Goldberg (2001:520))

Goldberg formulates this condition in order to account for the acceptability of the examples in (4), stating that the validity of this condition can be corroborated by the following contrast in acceptability:

(ii) a. * Sam unintentionally broke the eggs onto the floor.
b. Sam carefully broke the eggs into the bowl.

Furthermore, they contain path phrases, displaying paths in terms of literal motion. Consequently, two distinct paths co-occur in a single clause in these sentences. So they appear to violate the UPC, and therefore they apparently cast doubt on the motivation mentioned above.

The purpose of this paper is to show that the event structural account provided by Yasuhara (2012a), which proposes that the UPC effect follows from the nature of event structure, is on the right track. I argue that the examples in (4)-(6), which are supposed to be counterexamples to the UPC by many researchers, are apparent counterexamples. Although these sentences appear to contain two distinct paths, it is shown that one path further specifies the other; that is, the former specifies the underspecified part of meaning of the latter. Specifically, it is shown that path phrases can further specify change of state denoted by verbs when the path phrases refer to motion of only a part of an object, which I call anchored motion. As a result, the two paths in these sentences constitute a unique path. This analysis is consistent with Yasuhara (2012a), which argues that an event may not include more than one distinct change.

The organization of this paper is as follows. First of all, section 2 surveys an event structural account of the UPC developed by Yasuhara (2012a). Section 3 proposes that path phrases which denote motion in which only a part of an object moves along a path may further specify change of state exhibited by verbs. On the

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(Goldberg (1995:171))

Sentence (iia) shows that the adverb *unintentionally* is not consistent with sentences like (4). The adverb *unintentionally* in sentence (iia) denotes that the agent has no intention to cause the eggs to fall onto the floor. According to Goldberg, the unacceptability of (iia) follows due to the violation of condition (i); the agent lacks the intention to cause the motion of the eggs. Sentence (iib), on the other hand, is well formed because the adverb *carefully* guarantees the intention of the agent to cause the motion, satisfying the condition in (i).

Several researchers, however, point out that adverbs which do not imply intentionality of an agent can occur with sentences like (4), as shown in (iii) and (iva):

(iii) Sam accidentally broke the eggs onto the floor. (Matsumoto (2002:196))
(iv) a. Sam {carelessly / accidentally} broke the eggs into the bowl.
b. The machine sliced the salami onto the wax paper.
(Okuno (2003:169))

The adverbs *accidentally* and *carelessly* denote unintentionality of an agent, and the sentences in (iii) and (iva) seem to violate condition (i). Furthermore, *the machine* in (ivb) is an inanimate entity, so intentionality is irrelevant here.

As Goldberg claims, intentionality of an agent might be relevant in sentences like (ii). Given the sentences in (iii) and (iv), however, it seems reasonable to say that the condition in (i) is not crucially relevant to the co-occurrence restriction on a change of state expression and a change of location expression in a single clause. I leave open detailed investigation of the interaction between the UPC effect and intentionality for future research.

basis of this observation, section 4 argues that the path phrases in (4)-(6) further specify change of state denoted by the verbs. As a result, the change of state and change of location in these sentences form a unique change of state; no UPC violation arises. In section 5, I show that my explanation is widely applicable to other phenomena. Finally, section 6 gives concluding remarks.

2. An Event Structural Account of the UPC Effect

In this section, I argue that the co-occurrence restriction on a change of state expression and a change of location expression can be explained by saying that a single event may not involve two distinct results. Based on the event structural account of the UPC mentioned in section 1, I argue that change of state denoted by the verbs and motion expressed by the path phrases in (4)-(6) constitute a single unified result, in which the path phrases further specifies change of state of the verbs. This analysis is in accordance with Goldberg's (1991) observation that the UPC does not rule out a co-occurrence of a change of state expression and a change of location expression in a single clause when the latter further specifies the former.

The following discussions introduce some basic components of the theoretical framework proposed by Yasuhara (2012a), which is based on Levin and Rappaport (1995), Rappaport and Levin (1998, 2001) and Tortora (1998). The theory allows us to give an event structural account of the UPC effect.[3]

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[3] Although Levin and Rappaport (1995:60) also attempt to account for the co-occurrence restriction on a change of state expression and a change of location expression in a single clause, their explanation is quite different from mine. For example, consider the following:

(i) a. The cook cracked the eggs into the glass. (= (5a))
b. Daphne shelled the peas onto the plate. (= (5b))
c. slice the mushrooms into the bowl (Levin and Rappaport (1995:60))

Levin and Rappaport propose that *the eggs*, *the peas*, and *the mushrooms* in these sentences are polysemous. In sentence (ia), for instance, it is the whole eggs that the cook cracked, and it is the liquid part of the eggs that fell into the glass. Though both of the whole eggs and the liquid part of the eggs are referred to by the name *egg*, the referents are different; the name *egg* is polysemous between a whole egg and a liquid part.

Levin and Rappaport claim that an entity may undergo only one change. The NPs in (i) can denote two entities polysemously, and therefore the two entities denoted by these NPs may undergo two distinct changes. In (ia), for example, the whole eggs are cracked (change of state), whereas only the liquid parts of the eggs go into the glass (change of location).

According to Levin and Rappaport (1995), when an NP cannot refer to two entities, this NP is incompatible with a change of state verb and a path phrase in a single clause, which is exemplified by (iia):

(ii) a. * I broke the mirror into the garbage pail. (Levin and Rappaport (1995:61))
b. a mirror ≠ pieces of a mirror

In this sentence, although the NP *the mirror* refers to a whole mirror, it cannot refer to pieces of a

On the basis of the aspectual distinctions proposed by Vendler (1957), Levin and Rappaport (1995) develop several decompositional predicate representations. Events with accomplishment aspect, for example, are assumed to be composed of two events:

(7) Pat broke the window. (Levin and Rappaport (1995:79))
(8) [[*Pat* DO-SOMETHING] CAUSE [*the window* BECOME *BROKEN*]]
(cf. Levin and Rappaport (1995:83))

The sentence in (7) describes a situation in which Pat did something and as a result the window broke. Since Pat's doing something causes the window to break, his action can be regarded as a cause. The window's change of state, on the other hand, can be considered as a result caused by Pat's action. This causal relation can be captured by the decompositional predicate representation in (8). In this representation, the causing event is expressed by [*Pat* DO-SOMETHING] and the result event is designated by [*the window* BECOME *BROKEN*]. The causing event is connected with the result event by the function CAUSE, which represents a causal relation between them; the former causes the latter.

In this paper, I express a causal relation between a causing event and a result event in the following simpler way for convenience:

(9) $[[_{\text{CAUSE}}$] CAUSE $[_{\text{RESULT}}$]]
(10) $[[_{\text{CAUSE}}$ Pat did something] CAUSE $[_{\text{RESULT}}$ the window broke]]

The template in (9) is the basic representation of a causal relation between a causing event and a result event, in which $[_{\text{CAUSE}}$] denotes the causing event and $[_{\text{RESULT}}$] the result event. In our representation, we assign the decompositional predicate representation in (10), rather than that in (8), to the sentence in (7).

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mirror, as shown in (iib).

Levin and Rappaport's (1995) explanation, however, immediately faces a serious empirical problem. Although the following sentence includes the NP *the mirror*, in the same way as (iia), it is compatible with the change of state verb *break* and the path phrase *into the trash can* in a single clause:

(iii) John broke the mirror into the trash can little by little.

Sentence (iii) is acceptable in the interpretation in which John divided the mirror little by little while he put the piece of it into the trash can. In this interpretation, only a part of the mirror moves into the trash can at one time. In my account, the acceptability of this sentence can be explained by saying that the path phrase *into the trash can* denotes anchored motion, which is introduced in section 3.

Rappaport and Levin (2001:791) assume that a single clause can include two events at most, where the two events are dependent on each other in terms of a causal relation. The template in (9), thus, is assumed to be the most complex structure. This means that any decompositional predicate representation of complex event structure has to be composed of a causing event and a result event, but it can neither be composed of two result events nor two causing events.

For this reason, when multiple expressions which denote result state or result location co-occur in a single clause, they must refer to a single result state or result location, but not distinct ones. Tortora (1998) calls this constraint the Further Specification Constraint, as exemplified by the following sentence:

(11) The bottle broke open. (Levin and Rappaport (1995:59))

This sentence involves the change of state verb *break* and the result phrase *open*. At first sight, this sentence appears to include two result events: the event in which the bottle broke, and that in which it became open. A close scrutiny of this sentence, however, reveals that the result phrase *open* further specifies change of state denoted by the verb *break* (see footnote 9). This sentence can be considered to include a single unified result state, and therefore this sentence does not involve two distinct result events. The following decompositional predicate representation can be assigned to this sentence:

(12) $[[_{\text{CAUSE}}\ ]\ \text{CAUSE}\ [_{\text{RESULT}}$ the bottle broke open]]

In this representation, the change of state denoted by the verb *break* and that expressed by the result phrase *open* are both involved in the same result event, which shows that they refer to a single unified result state.

Given the theoretical framework developed here, we can give an event structural account of the sentences in (3), repeated here as (13):

(13) a. * Sam kicked Bill black and blue out of the room.
b. * Sam kicked Bill out of the room black and blue.

The sentences in (13) include the result phrase *black and blue* and the path phrase *out of the room*, which refer to change of state and change of location of the participant denoted by the NP *Bill*, respectively.[4] In these sentences, in contrast to

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[4] The sentences in (ia) and (iia) can be paraphrased with (ib) and (iib), respectively.

(11), further specification does not hold between the result phrase and the path phrase. In other words, these two phrases refer to two distinct result events. Therefore, the co-occurrence of the result phrase and the path phrase is prohibited.

Thus far, we have discussed that the UPC follows from the nature of event structure. The examples in (4)-(6), repeated here as (14)-(16), however, appear to pose a serious problem for this account:

(14) a. The butcher sliced the salami onto the wax paper.
b. Joey grated the cheese onto a serving plate.
c. Sam shredded the papers into the garbage pail.
(15) a. The cook cracked the eggs into the glass.
b. Daphne shelled the peas onto the plate.
(16) Kelly broke the branch off the tree.

These sentences include a change of state verb and a path phrase in a single clause, and apparently contain two distinct paths in terms of change of state and change of location.

If our event structural account of the UPC is on the right track, change of state denoted by the verbs and change of location expressed by the path phrases in these sentences should be involved in the same result events; that is, the path phrases further specify the meaning of the verbs, in the same way as *open* in (11).

In the next section, we observe that a certain type of path phrases may further specify the meaning of change of state verbs.

3. Motion Involved in Change of Spatial Extent

In section 3.1, we survey Goldberg (1991) and Lindner (1982, 1983), which discuss the co-occurrence of a change of state expression and a change of location expression in terms of further specification. Their analyses are mainly based on sentences denoting change of physical shape and position. In section 3.2, I propose that their analyses are applicable to change of state in terms of physical separation and combination.

(i) a. Sam kicked Bill black and blue. (= (2a))
b. Sam made Bill black and blue by kicking him.
(ii) a. Sam kicked Bill out of the room. (= (2b))
b. Sam caused Bill to go out of the room by kicking him.

These paraphrases show that the change of state (Bill's becoming black and blue) and the change of location (Bill's going out of the room) are both caused by Sam's kicking. That is, Sam's kicking is a causing event, and Bill's change of state and change of location are result events.

3.1. The Unique Path Constraint and the Anchorage Condition

Goldberg (1991) gives an extensive study of the co-occurrence restriction on a change of state expression and a change of location expression in a single clause, and formulates the UPC, as in (1), repeated here as (17):

(17) **Unique Path Constraint**: if an argument X refers to a physical object, then more than one distinct path cannot be predicated of X within a single clause.

At first sight, the UPC appears to ban any co-occurrence of a change of state expression and a change of location expression in a single clause, as in (18):

(18) a. * Sam kicked Bill black and blue out of the room.
b. * Sam kicked Bill out of the room black and blue.
(= (13))

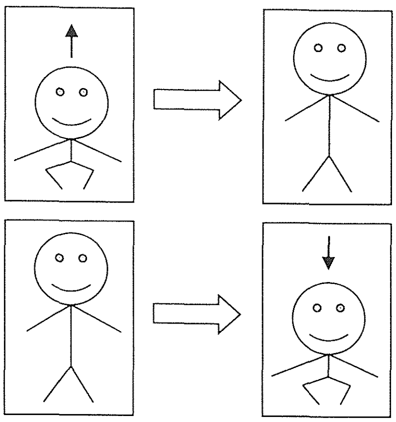
In these sentences, a result phrase and a path phrase are prohibited from co-occurring in a single clause.

The UPC, however, does not always work so. Witness the following data:

(19) a. John stood up straight.
b. He got down into a squatting position.
(Goldberg (1991:373), with slight modifications)

In these sentences, the result phrases *straight* and *into a squatting position* co-occur with the path phrases *up* and *down* in a single clause, respectively. Here, the path phrases and the result phrases in these sentences do not refer to two distinct paths. For example, in (19a), the path phrase *up* specifies motion that accompanies a change of position (becoming straight). The path phrase *up* and the result phrase *straight* refer to the unique path in terms of change of position. In (19b), likewise, the change of position denoted by the result phrase *into a squatting position* is accompanied by motion of a part of the body, which is referred to by the path phrase *down*. The examples in (19), thus, include a unique path in terms of change of position, and therefore do not violate the UPC. The situations described in (19a) and (19b) can be illustrated by the figures in (20a) and (20b), respectively:

(20)



The rightward arrows show transitions of situations; a situation in the left square changes into one in the right square. In the left square of (20a), it is illustrated that John in (19a) is trying to stand up. As a result of this, he stands up straight in the right square of (20a). In (20b), similarly, the left square shows that the referent of *he* in (19b) is trying to get down, and consequently he comes to be in a squatting position, as depicted in the right square. The upward and downward arrows in these figures represent directions of movements. Note that in both of the cases in (19a) and (19b), the legs are anchored at a fixed location (say, the ground), and what moves is only the upper half part of the body. In this way, change of physical position involves motion of only a part of an object.

A crucial difference between the sentences in (18) and (19) is whether or not a path phrase refers to motion of only a part of an object. The path phrases in (18) express translational motion (Talmy (2000:25)); movement which changes the location of an object. In (18) Bill is caused to move from the inside of the room to the outside. The path phrase *out of the room* expresses motion in which Bill changes his location. In (19), on the other hand, the movements described by the path phrases *up* and *down* do not change the location of the referents of *John* and *he*. Hereafter, let us call this type of motion anchored motion. Anchored motion is defined as follows:[5]

(21) Anchored motion is the movement in which an object undergoing change remains anchored at a fixed location, while rearranging parts of

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[5] This definition is based on Goldberg's (1991:373) statement:

(i) [T]he object undergoing the change remains anchored at a fixed location, while rearranging parts of its extension in space.

This statement is a part of explanation of the sentences in (19).

its extension in space.

Given the contrast in acceptability between (18) and (19), we can argue that a path phrase can co-occur with a change of state expression in a single clause when the path phrase refers to anchored motion; in this case, no UPC violation arises.

Similar observations are made in Lindner (1982, 1983). Lindner observes that verbs displaying spatial extension (i.e. a process in which an area covered by an object or a group of objects increases) like *spread* and *lengthen* involve paths which are inherent in the spatial extension, and these paths can be referred to by *out*:

(22) a. Stretch out the rope.
b. Lengthen out your stride.
(Lindner (1983:94))

In these sentences, the processes of stretching a rope and lengthening one's stride include motion which accompanies spatial extension, and the motion can be expressed by *out*.

Spatial reduction (i.e. a process in which an area covered by an object or a group of objects decreases) also involves motion, and the motion can be referred to by *down* (Lindner (1982:321)):

(23) She {scrunched / crunched} down in the corner so no one would see her.

The action of scrunching or crunching involves spatial reduction, where the height of space occupied by the referent denoted by the subject *she* decreases. The particle *down* denotes motion that accompanies this spatial reduction. In both of the cases in (22) and (23), the particles *out* and *down* refer to anchored motion, but not translational motion of objects undergoing change of spatial extent (i.e. spatial extension and reduction).

To summarize the analyses of Goldberg (1991) and Lindner (1982, 1983), change of physical position and spatial extent inherently include anchored motion, which can be referred to by path phrases. Spatial extension and reduction can be schematically represented by the following figures:[6]

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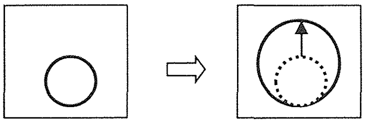
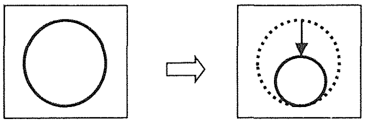
[6] As shown in the figures in (24), there are two types of change of spatial extent: spatial extension and spatial reduction. Detailed analyses of spatial reduction, however, are beyond the scope of this paper.

(24) a. Spatial extension



b. Spatial reduction



The upward and downward arrows in the squares represent motion which accompanies change of spatial extent, and the rightward arrows show transitions of situations. The figures in (24a) illustrate spatial extension, which corresponds to the examples in (19a) and (22); an action of standing up and a spatial extension involve motion from inward to outward. The figures in (24b), on the other hand, show spatial reduction, which corresponds to the sentences in (19b) and (23); an action of sitting down inherently includes motion from outward to inward.

In the sentences in (19), (22) and (23), expressions of change of physical position and spatial extent are allowed to co-occur with path phrases. At first glance, it appears that the change of physical position and spatial extent exhibits a distinct path, and anchored motion described by the path phrases represents another distinct path. The two paths, however, constitute a single unified path, because the change of physical position and spatial extent involves the anchored motion inherently; the path phrases further specify the change of physical position and spatial extent.

In sum, the UPC is a constraint which bans a single clause from displaying more than one distinct path. When a change of state expression and a change of location expression co-occur in a single clause, one has to further specify the other; otherwise, each of them would represent a distinct path, violating the UPC. Anchored motion can further specify spatial extension. For this reason, no UPC violation arises when a sentence includes an expression which denotes spatial extension and a path phrase which describes anchored motion.[7]

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[7] Generally, multiple modifiers which further specify the time or place may co-occur in a single clause:

(i) a. John arrived [in 2001] [in March] [during the third week] [in the afternoon] [at 2:00 pm].

b. The train arrived [in NYC] [at Penn Station] [on track 31].

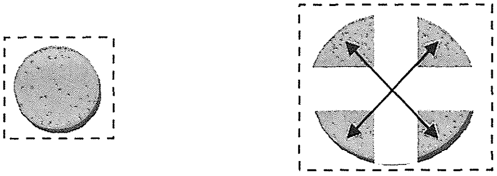
The modifiers in brackets specify the time of John's arrival in (ia), and the place where the train arrived in (ib). This also holds true of modifiers which display change of state or location in

3.2. Anchored Motion in Physical Separation

In this subsection, I argue that anchored motion can be involved not only in change of physical position and spatial extent, but also in change of state in terms of physical separation (i.e. a process in which an entity divides into different parts). The verb *break* in sentence (25), for example, may denote physical separation of the vase into two or more pieces.

(25) John broke the vase.

In this case, physical separation of an entity may involve spatial extension of an object, because the space occupied by the separated object can be conceived to become larger than that occupied by the original object. Ideally, a unified state and a separated state of an object may be illustrated in the following way:[8]



(26) a. Unified state b. Separated state

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terms of spatial extension:

(ii) Pity him, be reverent to the clay that can no more resist your touch, cover him deep from all your senses, and stand up straight into the sun again with your head beyond the high clouds. (*The English Review Vol. 33*, underlines mine)

The underlined part in this example includes two path phrases *up* and *into the sun* and the result phrase *straight*. The result phrase refers to the change of position, and the two path phrases specify the direction of standing. All of these modifiers further specify the meaning of the verb *stand*.

[8] Note that the meaning of the verb *break* varies with the type of NPs co-occurring with it:

(i) The plate broke.
(ii) She broke a leg in a skiing accident.
(iii) When the clutch broke, the car was locked into second gear.
(COBUILD)

Sentence (i) describes a situation in which a plate shattered into pieces, like the example in (25). Here, the verb *break* exhibits physical separation of an object. The verb *break* in (ii) and (iii), on the other hand, does not display this meaning; sentence (ii) expresses the situation in which the referent of the subject *she* injured her leg, and sentence (iii) the situation in which the clutch stopped working.

The conceptualization of the meaning of *break* shown in (26) is not applicable to the sentences in (ii) and (iii), suggesting that the scheme in (26) might be inappropriate for representing the meaning of the verb *break*. I leave this matter for future research.

In these figures, (26a) denotes the unified state of the vase, and (26b) shows its separated state. The squares composed of broken lines express the configurations of space occupied by (pieces of) the vase. The arrows in (26b) show processes of separation of the vase. As illustrated in these figures, the configuration of space occupied by the vase in the separated state is larger than that of space covered by the vase in the unified state.

What is important is that physical separation potentially involves spatial extension, in the same way as verbs of spatial extension such as *spread*. This parallelism between the verbs of physical separation and those of spatial extension can be confirmed by two pieces of evidence, which are shown in sections 3.2.1 and 3.2.2.

3.2.1. Compatibility with a Result Phrase Denoting Spatial Extension

First, my proposal that change of state verbs such as *break* and change of spatial extent verbs such as *spread* may share spatial extension meaning can be supported by consistency of these verbs with the result phrase *apart*.

(27) Trent leaped to the portside bilge pump, desperate to clear the remaining water from the hull before its weight *broke the vessel apart*.
(BNC, with slight modifications)

The result phrase *apart* refers to a state of being separated by a distance. It has been observed that change of state verbs such as *break* can appear with result phrases which further specify the meaning entailed by the verbs (Levin and Rappaport (1995), Washio (1997), Tortora (1998), among others); the fact that the verb *break* is consistent with *apart* suggests that the meaning of physical separation is entailed by the verb.[9] The change of state verb *bend*, by contrast, does not entail physical separation of an object, and *apart* is infelicitous as a result phrase:

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[9] Tortora (1998) argues that the verb *break* can co-occur with result phrases which further specify the meaning of the verb. Observe the following data:

(i) a. John broke the vase into pieces.
b. * Bill broke the vase worthless. (Jackendoff (1990:240))

The meaning of the verb *break* inherently includes physical separation but not change in value; the former is exhibited by the result phrase *into pieces* and the latter by the result phrase *worthless*. The verb *break* entails physical separation of an object, and the result phrase *into pieces* further specifies this meaning. The incompatibility of the verb *break* with *worthless* can be explained by saying that the former does not entail the meaning of the latter; the former cannot be further specified by the latter.

(28) * John bent the branch apart.
(In the interpretation where "John caused the branch to bend, as a result of this, it broke apart.")

In this way, change of state verbs which can co-occur with *apart* are restricted to those which entail physical separation.

Verbs referring to change of state in terms of spatial extension are also compatible with the result phrase *apart*:

(29) a. He spread his arms apart in a welcoming gesture,...
(G. Lamberson, *Personal Demons*)
b. He stretched his arms apart to emphasize his point.
(J. Cotton, *Image of the Beast*)

The verbs *spread* and *stretch* in these sentences denote spatial extension. In sentences (29a) and (29b), the referents of *his arms* move away from each other. The state of *his arms* being away from each other is further specified by the result phrase *apart*.

In this way, both change of state verbs like *break* and change of spatial extent verbs *spread* may co-occur with the result phrase *apart*, which further specifies spatial extension meaning of the verbs.[10]

In the following subsection, we observe the second piece of evidence for the parallelism in terms of spatial extension between these two types of verbs.

3.2.2. Compatibility with Spatial Expressions

The expressions *out* and *all over* (e.g. *all over the floor*, etc.), which we call spatial expressions hereafter, go along with verbs which display spatial extension, as shown below:

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[10] Both of change of state verbs like *break* and change of spatial extent verbs like *spread* are also compatible with result phrases such as *into pieces*, which specify the state of being separated in space:

(i) Maggie {broke / split / cracked / splintered / crumbled / divided / shattered} the bowl into a thousand pieces. (Jackendoff (1990:117))
(ii) a. The jute is spread in pieces,... (P. Sharp, *Flax, Tow, and Jute Spinning*)
b. The battleship became enlarged, spreading into pieces then exploded from the inside out. (L. Cabral, *Oisin*)

Result phrases like *into pieces* denote a state of being spatially separated, and the sentences in (i) explicitly show that the verbs such as *break* entail physical separation. The physical separation denoted by result phrases like *into pieces* are also consistent with change of spatial extent verbs, as shown in (ii). The fact that verbs of change of state in terms of separation and those of spatial extension are both compatible with result phrases like *into pieces* supports my proposal that these two types of verbs may share spatial extension meaning.

(30) a Spread out the newspaper to read.
b. He stretched out on the couch.
(Lindner (1983:99))
(31) a. Once the lampshade fell from the ceiling and the glass broke and spread all over the floor. (G. Lunsford, *Georgia Is on My Mind*)
b. We put new carpet in our family room about ten years ago and it has stretched all over the place. (R. Rouse, *Life Is*...)

In sentences (30) and (31), the spatial expressions refer to spatial extension exhibited by the verbs *spread* and *stretch*. In the sentences in (30), for example, *out* specifies change of location that is involved in spatial extension of the referents denoted by *the newspaper* and *he*. In (31), likewise, change of location which accompanies spatial extension of the referents of *the glass* and *new carpet* are referred to by the spatial expressions *all over the floor* and *all over the place*, respectively. In this way, verbs that express spatial extension are compatible with spatial expressions which show change of location inherent in the spatial extension.

In the same way as the result phrase *apart*, which we have discussed in section 3.2.1, these spatial expressions cannot appear with the verb *bend*, which does not entail spatial extension:

(32) a. * John bent the branch *out* on the floor.
(in the interpretation where "John broke the branch into pieces by bending it, as a result of this, the pieces spread out on the floor.")
b. * John bent the branch *all over the floor*.
(in the interpretation where "John broke the branch into pieces by bending it, as a result of this, the pieces spread all over the floor.")

On the basis of the contrast in acceptability between (30)-(31) and (32), let us assume that change of state verbs which are compatible with spatial expressions are restricted to those which entail spatial extension. If this assumption is correct, the following data verify that verbs of physical separation also entail spatial extension.

(33) a. The side mirror was crushed off and the driver's window broke out.
(D. Meyer, *Life Is a Road, Ride It Hard!*)
b. They think the windows shattered out because...

(R. Cragin, *Wicked Winds*)

(34) a. ... you might have seen an object break into pieces all over the floor, then slowly vanish.
(D. Franson, *2D Artwork and 3D Modeling for Game Artists*)

b. The china shattered all over the deck. (D. Hinton, *Letters from the Dead*)

The verbs *break* and *shatter* in these sentences express physical separation of an entity into more than one piece, and the spatial expressions display spatial extension. In the sentences in (33), the spatial expression *out* modifies change of location which is involved in spatial extension of the windows in terms of physical separation. Likewise, *all over* in the sentences in (34) exhibits motion which is included in physical separation denoted by the verbs.

In this way, verbs of physical separation (e.g. *break*) and those of spatial extension (e.g. *spread*) can co-occur with spatial expressions which may refer to spatial extension (e.g. *out* and *all over*).

To sum up this section, verbs of physical separation and those of spatial extension are both compatible with result phrases and spatial expressions which can refer to spatial extension.[11] This parallelism between these two types of verbs strongly suggests that verbs of physical separation may entail spatial extension. In section 3.1, we have observed that verbs of spatial extension are compatible with path phrases, because they inherently include motion, which is called anchored motion. Then, we can predict that verbs of physical separation may involve anchored motion, and they are compatible with path phrases when the path phrases refer to the anchored motion. In the next section, we argue that this prediction is correct.

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[11] The parallelism between verbs of physical separation and those of spatial extension can also be verified by their compatibility with subjective motion expressions. Subjective motion expressions denote spatial range of an entity such as a road, and they can be considered to be related to spatial extent (cf. Jackendoff (1990)). For this reason, this kind of expression is compatible with change of spatial extent verbs, as shown below:

(i) a. The road extends from San Francisco to Los Angeles. (Matsumoto (1996a:141))

b. The road widens at the junction. (Matsumoto (1996b:185))

c. Down below, beyond wisps of vapor steaming past, ocean spreads out to the horizon.
(W. Campbell, *Apotheosis*)

Sentence (ia), for example, expresses that the road ranges from San Francisco to Los Angeles.

Some verbs of physical separation are also compatible with subjective motion expressions. The following sentences include the change of state verbs *split* and *break*:

(ii) a. Go right onto North Bloomfield Road and follow it up to the top of the hill where the road splits. (L. Austin, *Mountain Bike! Northern California*)

b. From Copper Basin, several other roads break out to the south, east, and north.
(T. Lopez, *Idaho, a Climbing Guide*)

Sentence (iia) indicates that the road branches at the top of the hill. Sentence (iib), likewise, expresses that several roads run to several directions from Copper Basin.

In this way, both verbs of physical separation and ones of spatial extension are compatible with subjective motion expressions. The data in (i) and (ii) further support the parallelism between the two types of verbs in terms of spatial extension.

4. Separation as Spatial Extension

As we have observed in section 1, the sentences in (14)-(16) have been supposed to be counterexamples to the UPC by many researchers, because these sentences include two distinct changes in a single clause:

(35) a. The butcher sliced the salami onto the wax paper.
b. Joey grated the cheese onto a serving plate.
c. Sam shredded the papers into the garbage pail.
(= (14))

(36) a. The cook cracked the eggs into the glass.
b. Daphne shelled the peas onto the plate.
(= (15))

(37) Kelly broke the branch off the tree. (= (16))

At first sight, these sentences are structurally similar to the following in that sentence (38) includes a path phrase, exhibiting motion of an object:

(38) John threw the ball into the room.

A close scrutiny of these two types of sentences, however, reveals that the sentences in (35)-(37) are crucially different from (38) in the nature of motion. Sentence (38) displays translational motion, which can be confirmed by the unacceptability of the following sentence:

(39) * John has thrown the ball into the room, but he still holds the ball in his hand now.

This sentence suggests that the ball moves into the room, so it cannot stay in John's hand after he threw it.

What is relevant in the sentences in (35)-(37), on the other hand, is anchored motion, where only a part of an object moves along a path.

It is easier to demonstrate this point as to the sentences in (36) and (37). In (36), for example, only content of eggs or peas move along a path denoted by the path phrases, and the shell parts of them remain anchored at a fixed location, say, in one's hand. In fact, the following sentence cannot describe the situation where "John broke the egg, and then, both of the liquid and shell fell into the bowl":

(40) # John broke the egg into the bowl.

In sentence (37), likewise, what moves from the tree is only the branch, and the tree remains anchored at a fixed location, say, at the ground. Thus, the sentences in (36) and (37) involve anchored motion, and hence they satisfy the UPC.

This observation also holds true for the sentences in (35), as illustrated by the following sentences:

(41) a. Grate or cut the cheese into the sauce, reserving a little to grate over the top of the dish.
(A. Sammy, *Aunt Sammy's Radio Recipes, the Underline is Mine*)
b. John has sliced the carrot into the bowl, but he kept the half of it for tomorrow, so he didn't slice the half part.

The underlined parts in the sentences, in which the interpretation where the whole part of the cheese or the carrot moves along a path is cancelled, do not contradict the former part of the sentences.[12] This fact explicitly shows that the sentences in (35) entail motion of only a part of an object, and the whole part of the object does not have to move along a path. The rest of the object can be considered to be anchored at a fixed location. The path phrases in (35), thus, refer to anchored motion, and these sentences are in conformity with the UPC.

When path phrases in sentences such as (41) refer to translational motion, these sentences become unacceptable, as illustrated by the following examples:

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[12] Similar observations are made by Rappaport and Levin (2001) and Pi (1999). As to sentence (i), Pi (1999:191), for example, gives the following remarks:

(i) Greg cut the carrot into the bowl.
(ii) Note as well that the process may be one stretch of the cutting action, but the individual pieces fall independently and successively *into the bowl*. Thus, each instance of a piece falling into the bowl might be considered to be a minimal part to the process of *to cut a carrot into the bowl*.

In the quotation in (ii), Pi observes that the event of cutting the carrot into the bowl includes several actions of cutting it. The pieces of it made by each cutting action fall into the bowl successively. Since the path phrase *into the bowl* in (i) refers to motion of a part of the carrot, the motion can be considered to be anchored motion.

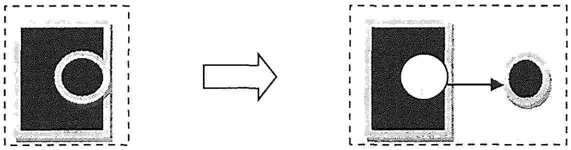
(42) # Mary cut the sausage into the pan.
  a. (Acceptable in the interpretation where "Mary put a sausage into the pan while cutting it little by little.")
  b. (Unacceptable in the interpretation where "Mary put cuts in a sausage (but the sausage is not cut into pieces) and put it in the pan.")

The sentence in (42) is acceptable in the interpretation shown in (42a), but not in the interpretation in (42b). The interpretation in (42a), in which only a part of a sausage goes into the pan while Mary cuts the sausage, explicitly includes anchored motion of the sausage. On the other hand, the interpretation in (42b), in which a whole part of a sausage goes into the pan, involves translational motion of the sausage. The unacceptability of sentence (42) in the interpretation of (42b) can be attributed to the translational motion of the sausage.

In this section, we have observed that the sentences in (35)-(37) include anchored motion, but not translational motion. This means that the path phrases in these sentences further specify change of state denoted by the verbs. That is, the path phrases refer to motion inherent in processes of spatial extension in terms of physical separation. As a result, these sentences include only one path, and no UPC violation arises.

The spatial extension expressed by the sentences in (35)-(37) can be represented in the following figures:

(43) Spatial extension involving physical separation



In these figures, the thick white arrow displays a transition of situations. The thin arrow represents anchored motion of the circle. In the left square, the black square and the circle constitute a unit. The right square exhibits spatial separation of the circle from the black square. The dotted squares denote ranges of space covered by the black square and the circle. The figures in (43) show that the black square and the circle in the separated state occupy a larger area than they are in the unified state.

5. Further Considerations

In the previous section, we have observed that the sentences in (35)-(37), which are apparently problematic for the UPC, are not true counterexamples to it. The acceptability of these sentences can be explained by saying that the path phrases in these sentences refer to anchored motion.

Verbs which are compatible with path phrases, however, are not restricted to those which denote physical separation. In fact, it has been pointed out that verbs which denote change of state in terms of melting and emptying also go along with path phrases:

(44) The chocolate melted out of the box. (Jackendoff (1990:241))
(45) John emptied the bottle into the sink.

In these sentences, the change of state verbs *melt* and *empty* co-occur with a path phrase, and they have been claimed to be counterexamples to the UPC (Levin and Rappaport (1995)).

A close investigation into these examples, however, unveils that the path phrases in these sentences refer to anchored motion, and hence they do not violate the UPC. Let us first consider the sentence in (44). As shown in the following sentence, the verb *melt* is compatible with the result phrase *apart* and the spatial expressions *out* and *all over the grate*, all of which display spatial extension:

(46) John melted the handle and the cup *apart.*
(In the interpretation where "John caused the handle and the cup (which are made of ice) to become apart by melting it.")
(47) John melted the ice *out* on the floor.
(In the interpretation where "John melted the ice, and then the water spread out on the floor.")
(48) In just minute the plastic was melted *all over the grate.*
(J. Holmes, *There Should Have Benn Roses*, the italics are mine)

Given the consistency of the verb *melt* with *apart*, *out* and *all over the grate*, we can predict that the sentence in (44) includes anchored motion. This prediction is borne out by the following sentence, which shows that sentence (44) does not entail translational motion of the chocolate:

(49) The chocolate has melted out of the box, but there is still some chocolate in it now.

The underlined part in this sentence does not contradict the former part of the sentence, which explicitly shows that what is entailed by (44) is not translational motion, but anchored motion.

Similarly, the sentence in (45) involves anchored motion, which can be confirmed by the following sentence:

(50) John emptied the bottle into the sink.
(In the interpretation where "John poured only liquid into the sink, and the bottle remained in his hand.")

Emptying a bottle of water entails motion of the water out of the bottle, and the sentence in (45) necessarily involves physical separation of the water from the bottle. In fact, sentence (45) is acceptable in the interpretation where the bottle, which undergoes change of state in terms of emptying, remains in John's hand, as illustrated in (50). This explicitly shows that the path phrase in (45) refers to anchored motion.

6. Conclusion

Yasuhara (2012a) states that the UPC effect comes from the nature of event structure: a single clause may not include more than one distinct result. In this paper, assuming that Yasuhara's analysis is on the right track, we have argued that the sentences in (35)-(37), which are considered to be counterexamples to the UPC by many researchers, are apparent counterexamples. Although these sentences include a change of state verb and a path phrase in a single clause, and it appears that they contain two distinct paths, we have shown that change of state exhibited by the verb and motion denoted by the path phrase constitute a single unified path. Specifically, we have claimed that path phrases in these sentences refer to motion which is inherently involved in the change of state denoted by the verbs. For this reason, no UPC violation arises in the sentences in (35)-(37).

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