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Semantic Roles – The Aspectual Interface Hypothesis and Argument Realization

Ritgerð til B.A.-prófs

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Abstract

It is widely accepted that meaning plays a large part in the syntactic realization of arguments of verbs. Locating component of meaning that drives the various realizations of arguments has been the focus of a field of linguistics commonly referred to as argument realization. This paper examines two theories of argument realization. The earliest attempts to explain the divergent behavior of arguments of verbs utilized semantic roles. They are labels that identify the relation an argument has to its verb and the roles offer a way to make generalizations about the behavior of arguments. Semantic roles proved to be unsuccessful in explaining argument realization. The discussion on semantic roles offers a context for the second theory this paper deals with.

Tenny (1992) developed the Aspectual Interface Hypothesis to provide a system of linking semantic roles to the surface structure of sentences. She maintained that syntax and semantics should be kept separate and that aspectual factors functioned as the interface that connects the two together. The Aspectual Interface Hypothesis states that when the direct internal argument of a verb undergoes change it should measure out the event. Even though The Aspectual Interface Hypothesis presents an insightful way to link semantic roles to argument realization it doesn't offer explanation for much beyond the selection of objects. The fact that the external argument can measure out events proves that the Aspectual Interface Hypothesis is inaccurate in stating that this is a property only awarded to the direct internal arguments of verbs. This paper maintains that the explanatory scope of the Aspectual Interface Hypothesis could be expanded to include subject selection by awarding the quality of measuring out to the external arguments of verbs as well as the direct internal arguments.

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1. Introduction

The way verbs realize their arguments has inspired a great deal of linguistic research. The aim of this previous inquiry has been to discover the different syntactic expressions of the arguments of verbs and produce explanations as to why their arguments are realized as they are. Verbs describe events but they require participants of varying types, depending on the event described, in order to properly depict a particular scene and form a grammatical sentence. These participants are the arguments of verbs. *Break* is a verb that needs only one argument to form a grammatical sentence. In (1) the noun phrase *the window* is the argument of *break* which describes it as having undergone a change of a specific kind.

(1) The window broke.

Break can also describe an event where an entity causes a change in an object.

(2) John broke the window.

In (2) the noun phrases *John* and *the window* are the arguments of *break*. Here *break* assigns specific interpretations to each of its arguments. *John* is the individual that causes *the window* to undergo the change that is described by *break*.

The sentences in (1) and (2) are examples of how a verb can realize its arguments in different ways. *Break* is comfortable with realizing the argument that undergoes change, *the window*, as its subject but the same argument can appear as the object of the verb as well when the causer, *John*, takes the subject position. It should be noted that the verb insists on a different interpretations of its subject in (1) from that of its subject in (2). This kind of shuffling of arguments is an example of argument alternation explained by Levin (1993) as “alternations in the expressions of arguments, sometimes accompanied by changes of meaning” (2). The alternation of arguments between sentences (1) and (2) is the causative/inchoative alternation and alternates between the sentence forms “NP V NP” and “NP V”.

Cut describes an entity which causes a separation in the material integrity of another entity, usually with the aid of an instrument. *Cut* has to have two arguments in order for a sentence to be grammatical. It demands an entity responsible for the cutting as its subject and an argument denoting the object being acted on, either appearing as the direct object of

the verb such as in (3) or as the object of a preposition as in (4). Alternating an argument between its position as the object of the verb and the object of the preposition *at*, such as *cut* does in (3) and (4) is an example of the conative alternation. When the preposition *at* is present it forces a particular reading of the sentence, namely that the cutting has not succeeded and that a separation in the material integrity of an entity has not been achieved.

(3) John cut the bread.

(4) John cut at the bread.

The conative alternation is however not an option for *break*, seen in (5), and since *cut* demands two arguments it cannot undergo the causative/inchoative alternation as is evident in (6).

(5) *John broke at the bread.

(6) *The bread cut.

There is great variation between verbs as to what alternation they can take part in but at the same time there are pockets of verbs that share exactly the options of alternations and these verbs tend to be similar in meaning. *Break* and *cut* each head a class of verbs that are closely related semantically and behave in the same syntactic manner. It is widely accepted that the meaning of a verb plays a part in what kinds of alternations are open to it. Levin (1993) draws the following conclusion from a thorough investigation into the syntactic options of verbs in the English language.

“[T]he nature of semantic knowledge confirms that various aspects of the syntactic behavior of verbs are tied to their meaning. Moreover, verbs that fall into classes according to shared behavior would be expected to show shared meaning components.”

(5)

The verb classes Levin identified are just shy of two hundred. Again, these are classes of verbs that share exactly the options of alternations. Many of these verb classes do however share a selection of alternation options between one another. *Break* and *cut*, as was discussed above, show different behavior when it comes to the conative alternation and the

causative/inchoative alternation, perhaps unsurprisingly since they belong to different verb classes, but both of these verbs can nevertheless undergo the instrument subject alternation, seen in (7) through (10). This alternation moves the object of a preposition which denotes an instrument to the subject position of the sentence, reducing the number of arguments from three to two. The argument that acts as the causer of the event is removed altogether.

(7) John broke the window with a stick.

(8) The stick broke the window.

(9) Margaret cut the bread with a knife.

(10) The knife cut the bread.

Break and *cut*, although belonging to different classes of verbs, share syntactic options such as the instrument subject alternation but show different behavior as well. Seeing that the options for argument alternations are so closely linked to meaning, like Levin (1993) points out above, these verbs must share some components of meaning although they describe different events.

It is the search for the components of meaning that are relevant to the alternations of the arguments of verbs that has brought about the field of linguistics which deals with “the study of the possible syntactic expressions of the arguments of a verb” and is commonly referred to as argument realization (Levin and Rappaport Hovav, 2005, 1). In outlining the major challenges for a theory of argument realization Levin and Rappaport Hovav (2005) mention that one of the objectives of such a theory “is the isolation of the relevant components of meaning and the explication of their connection to the range of argument realization options” (2).

In this paper I will examine two theories of argument realization. Semantic roles are perhaps the earliest incarnation of a theory attempting to explain the behavior of arguments of verbs. Charles J. Fillmore published a study in 1968 called “The Case for Case” which according to Levin and Rappaport Hovav (2005) sparked the modern interest in semantic roles. The roles are labels that are applied to the arguments of verbs and they identify the role of each argument in the event described by the verb. The section on semantic roles is intended to provide a context for the discussion on The Aspectual Interface Hypothesis.

Semantic roles proved to be problematic in adequately explaining argument realization. Linguists have had difficulties with properly defining and agreeing on the meaning and scope of each role. Carol Tenny (1989) acknowledges the usefulness of

semantic roles but proposes that semantic and syntactic representations should be kept separate. She developed the Aspectual Interface Hypothesis as a system of linking semantic observations to syntactic realization of arguments. The Aspectual Interface Hypothesis maintains that a property of only the direct internal arguments of verbs, that of measuring out events, plays a crucial role in argument realization. I will offer an overview of The Aspectual Interface Hypothesis and exhibit examples that show how useful it can be in explaining the selection and expression of the direct objects of certain verbs. There are however instances where the external argument can be seen to measure out events. In this regard the Aspectual Interface Hypothesis is inaccurate and I propose that it would benefit from including the external arguments as possible candidates for measuring out events. Furthermore, this could expand the explanatory power of the theory to the selection and expression of subjects as well as objects.

2. Semantic Roles

A very influential account of semantic roles is Fillmore's (1968) paper "The Case for Case". Gruber's (1965) "Studies in Lexical Relations" and subsequently Jackendoff's (1972) *Semantic Interpretations in Generative Grammar* which was based on Gruber's ideas are also prominent theories of semantic roles. What perhaps motivates the development of these theories is the inability of the grammatical functions subject and object to account for certain semantic relations. Fillmore (2003) observes "that no semantically constant value is associated with the notion 'subject of' ... and that no semantically relevant relations reside in the surface subject relation" (41). Jackendoff (1974) agrees with this and states that "the 'natural' grammatical relations such as subject and object do not correspond in any simple fashion to the understood semantic relations" (25). In light of observations like these Fillmore (2003) rejected the idea that semantic interpretation should be kept separate from the syntactic component of language and stated that certain "facts about language ... have been shown [to] [be] explainable within a combined syntactic-semantic component" (Fillmore, 2003, 138-139). This statement went against Chomsky's (1964) views that grammar was independent from semantics and his claim that "any search for a semantically based definition of "grammaticalness" will be futile" (15).

Semantic roles are essentially labels that are linked to arguments of verbs in order to identify the role each argument plays in the event described by the verb. Fillmore referred to semantic roles as labeled relations, meaning that “the relation of an NP to a sentence, or to a VP, [...] is mediated by a pseudocategory label such as Manner, Extent, Location, Agent” (2003, 40). Unlike the traditional grammatical relations subject and object the semantic roles are not tied to a specific syntactic position. Instead they appear with their arguments in whatever syntactic position a verb can place them. Verbs can have a number of arguments for each of which there exists a role according to the theories of semantic roles. The verb *break* for example can have up to three arguments while *buy* can have four. The roles awarded to each argument of a verb then form a list, whose size depends on the number of arguments a verb can take. The list of semantic roles associated with each verb, which contains semantic information that is seemingly relevant to syntactic phenomena, has been used as an instrument to explain why verbs realize their arguments in the various and divergent ways they do.

There has never been a consensus of opinion on the exact number of roles available but it has been assumed that they are few in number. Semantic relations of arguments to their verbs could be highlighted by calling “the subject of the verb *hit* the ‘hitter role’, that of the subject of *kill* the ‘killer role’, of *build* the ‘builder role’ and so on” (Dowty, 1991, 550). These roles would then simply echo the meaning of each verb. However, this does not capture the more general semantic information which is common to all three verbs. It could be said that these roles are subcategories of the Agent role which identifies an initiator of the events described by the verbs. Roles displaying general qualities are more adapt at capturing similarities between different verbs and limiting the number of roles available offers the chance to generalize across various verbs. Different researchers have utilized different roles between theories but they are usually drawn from the list below proposed by Saeed (2003) as a general overview of semantic roles.

AGENT: the initiator of some action, capable of acting with volition.

PATIENT: the entity undergoing the effect of some action, often undergoing some change in state.

THEME: the entity which is moved by some action, or whose location is described.

EXPERIENCER: the entity which is aware of the action or state described by the predicate but which is not in control of the action or state.

BENIFICIARY: the entity for whose benefit the action was performed.

INSTRUMENT: the means by which an action is performed or something comes about.

LOCATION: the place in which something is situated or takes place.

GOAL: the entity towards which something moves, either literally or metaphorically.

SOURCE: the entity from which something moves, either literally or metaphorically.

(149-150)

In the following examples the *window* retains the same semantic relation to the verb in either the subject or object position.

(11) John broke the window.

(12) The window broke.

Jackendoff (1974) claims that examples such as this have “led many grammarians to feel that something is seriously wrong with the traditional notion of grammatical relations” (25-26). Semantic roles are then devised, at least in part, to account for semantic relations that subject and object are unable to do. In example (11) above the *window* would receive the semantic role Patient as it undergoes the effect of the action described by the verb and *John* would be labeled as an Agent because he initiates the action described by the verb. This is useful because in (12) the *window* retains this label even though it appears in different syntactic positions. It can be seen in these examples that the roles help “to keep track of identity and distinctness of NPs of particular semantic arguments of a predicate during the course of a derivation” (Dowty, 1991, 549). By keeping track of the semantic relations of arguments to their verbs the interaction of these relations and syntax can be commented on and generalizations made about the nature of meaning in syntactic constructions.

2.1 Fillmore

In the “Grammar of Hitting and Breaking” Fillmore (2003) compares the options of argument alternations open to these verbs and proposes a list of roles for each verb. He explains the syntactic differences between the verbs with observations about what kinds of events they depict and ascribes their syntactic differences to their subtleties in meaning. Both *hit* and *break* can appear with body-part nouns where the nouns within the verb phrase, *Bill’s leg*, are expressed as a single noun phrase such as in examples (13) and (14) below.

(13) John broke Bill's leg.

(14) John hit Bill's leg.

It is however also possible for *hit* to express the nouns as two constituents where one noun, *Bill*, is the object of the verb and the other, *the leg*, the object of a locative preposition such as in (16).

(15) *John broke Bill on the leg.

(16) John hit Bill on the leg.

The reason for *hit*, and not *break*, being open to the body-part possessor ascension alternation is that it takes a Location role while *break* is associated with a Patient role. Fillmore (2003) explains it in the following way.

One of the properties of *hit*, namely the existence of certain kinds of paraphrases when it is used with body-part nouns, is apparently accounted for by referring to the ways in which body-part nouns are used as indicators of places [(Location)] rather than as indicators of objects [(Patients)].

(136)

In (13) and (14) the body-part is seen as *Bill* himself and can be accepted as Patient as well as Location. However, in (15) and (16) the possessor, *Bill* in this case, “has “ascended” out of the body-part NP” (Levin 1993, 72), and becomes a more overt candidate for Location.

The following example of alternation is also directly linked to the Location role of *hit* and is therefore not possible for *break*. The conative alternation is a subcategory of transitivity alternations. The object of the verb in the transitive form becomes the object of the preposition *at* in the intransitive form. This form describes an action that is an attempt but the results are not specified. Because *break* specifically describes a change of state, which is indicated by it taking a Patient role, it cannot undergo this alternation.

(17) *John broke at the window.

(18) John hit at the window.

Both *break* and *hit* do however share the instrument subject alternation. This alternation is a subcategory of the oblique subject alternations that “involve verbs that have ‘agent’ subjects, but that alternatively may take as subjects noun phrases that can be expressed in [...] prepositional phrase when the verb takes its [...] ‘agent’ subject” (Levin, 1993, 79).

(19) John broke the window with a stick.

(20) The stick broke the window.

(21) John hit the window with a stick.

(22) The stick hit the window.

Both verbs have the Instrument role in their role list which is usually realized as the object of a preposition as is the case in examples (19) and (21) above. The Instrument role can however also appear as the subject of the sentence. Fillmore explains this behavior by proposing a selectional hierarchy for the subject position.

If there is an [Agent], it becomes the subject; otherwise, if there is an [Instrument], it becomes the subject; otherwise, the subject is [Patient].

(58)

When the Agent role is present it takes the subject position such as in (19) and (21) where *John* acts as Agent. When the Agent is not present the Instrument role, which is next in the hierarchy, takes the subject position as can be seen in (20) and (22).

Break undergoes the causative/inchoative alternation which is a subcategory of transitivity alternations. With this alternation the object of a transitive form of a verb becomes the sole argument and takes the subject position. This is usually a property of verbs describing a change of state of some sort.

(23) The window broke.

(24) *The window hit.

In the case of *break* it can be noticed, much like the hierarchy predicts, that since neither the Agent nor the Instrument is present the Patient role, the *window*, takes the subject position. *Hit* on the other hand cannot undergo this alternation. It has already been

established that these verbs share two roles in the roles lists proposed by Fillmore, namely Agent and Instrument, but the third role which is central the meaning of each verb (and the reason for their divergent behavior) is not shared. The difference between these verbs according to Fillmore (2003) is that *break* is understood as undergoing change of state while *hit* describes physical contact between two objects (130). *Break* then takes a Patient role while *hit* takes a Location role. The conclusion Fillmore draws from his research on these verbs is that upholding some sort of distinction between syntactic representation of language and semantics is bound to fail. The semantic roles, in Fillmore's words, "provide concepts of the kind that can be used quite directly for expressing semantic assertions about linguistic expressions" (2003, 138).

2.2 Jackendoff

Jackendoff's (1974) approach to semantic roles, which was based on Gruber (1965) is slightly different. He focuses on the centrality of the Theme and proposes that in "every sentence there is a noun phrase functioning as Theme" (29). The number of roles he refers to is quite limited as can be seen in (25).

(25) Agent, Theme, Location, Source, Goal.

Along with this list of roles Jackendoff proposes the Thematic Hierarchy. Observations about selectional constraints on arguments bearing certain semantic roles are made with reference to the thematic hierarchy which can be seen in (26) below.

- (26) 1. Agent
2. Location, Source, Goal
3. Theme

Measure verbs are a class of verbs which "describe the value of some attribute of an entity" and it has been observed that these verbs cannot appear in the passive construct (Levin 1993, 272). First, consider a verb that can undergo the passive, such as *touch*.

(27) John was touching the bookcase

(28) The bookcase was being touched by John.

Jackendoff mentions that *John* in (27) can either be seen as an Agent or a Theme. *John* could actively be searching for a scratch on the *bookcase* which would make him an Agent or just accidentally touching it without realizing it which would make him a Theme. The point is that (27) is open to both interpretations. *John* in (28) can however only be interpreted as an Agent. It is then clear that even when interpretations of active sentences are ambiguous as to whether the subject is an Agent or a Theme the passive construction forces an Agentive reading on the argument that could be either Theme or Agent in the subject position of the active sentence. Consider the condition proposed by Jackendoff:

The passive *by*-phrase must be higher on the Thematic Hierarchy than the derived subject.

(43)

Sentence (29) is an example of a measure verb. Jackendoff (1974) points out that “the measure phrase is an expression of Location on the scale of value being measured” (44). In (29) the *book* is the Theme and *five dollars* are the Location. It can be seen in example (30) that Jackendoff’s condition on passives is violated because the Theme, the *book*, is lower on the Thematic Hierarchy than the derived subject, *five dollars*.

(29) The book costs five dollars.

(30) *Five dollars are cost by the book.

This condition also explains why certain psychological verbs cannot undergo the passive, such as *strike*, while others, like as *regard*, can.

(31) Bill strikes Harry as pompous.

(32) *Harry is struck by Bill as pompous.

(33) Harry regards Bill as pompous.

(34) Bill is regarded by Harry as pompous.

Jackendoff explains that the “adjective functioning as an abstract Location, is attributed to the subject in [(31)] and to the object in [(33)]”. He adds that this “means that the subject is

Theme with *strike* ... but the object is Theme with *regard*” (45). This is crucial to the different options these verbs have in undergoing the passive. The derived subject in (32), *Harry*, is the Location role and the by-phrase, *Bill*, is occupied by the Theme role. This does not follow the condition on passives and (32) is therefore ungrammatical. In (34) the Theme is however the derived subject and the Location argument contained in the by-phrase. This adheres to the condition that the by-phrase should be higher on the Thematic Hierarchy.

These proposed solutions to the problem of argument realization differ somewhat such as in the selection of roles utilized and how the hierarchies are realized. But their similarities offer an overview of the general qualities many of the theories of semantic roles have in common.

2.3 Problems for Semantic Roles

Semantic roles offer a way to monitor arguments of verbs and therefore the grounds to make statements about syntactic constructions based on meaning. Despite being used extensively in syntactic theory the semantic roles have been very controversial. Much of the debate has revolved around the proper definitions of the roles themselves where in some cases certain roles have too much scope and can therefore include irrelevant information that makes generalizations difficult. Evidence has also been found which weakens some of the assumptions that make up the system of semantic roles. This includes examples where there isn't any obvious role that distinguishes between the arguments of a verb and instances where two roles seems to apply to a single argument of a verb.

Huddleston (1970) brings up the question whether the semantic roles suggested in Fillmore (1968) prove to be adequately defined. The Instrument role is defined by Fillmore as “the case of the inanimate force or object causally involved in the action or state defined by the verb.” (2003). Huddleston offers the following example.

(35) John opened the door.

(36) The key opened the door.

(37) The wind opened the door.

In (35) *John* acts as Agent but according to Fillmore's definition of the Instrument role both the *key* and *wind* act as Instruments, considering that both are inanimate. Huddleston (1970) does however detect a difference between the *key* and *wind* in that the *key* "presupposes some unexpressed Agentive participant, whereas [the *wind*] does not" (503). The criteria for the Instrument role, i.e. that arguments be inanimate, does therefore seem to be too wide since it can include nouns that are intuitively bad examples of an instrument. Huddleston seems to be suggesting that as well as having the feature inanimate the argument acting out the Instrument role should also be an extension of some other force. This definition excludes the *wind* from the Instrument role but Huddleston remarks that it may have more in common with Agents than it does with Instruments. He says that *John* and the *wind* "may be complementary variants of a single case" because they "cannot cooccur in the same proposition" (505). The Agent role, as it was devised by Fillmore, does however have animateness as a defining feature, making it too narrow to include the *wind*. According to Huddleston's observations, Fillmore's list of roles is incomplete or imbalanced because one role seems to be too wide and another too narrow. This is the sort of predicament that linguists get into when deciding how to properly define semantic roles.

Given that the number of roles is generally presumed to be limited, speculations about the scope of each role can become a sort of balancing act. Huddleston offers two solutions to the problem mentioned above. The role Force could be added to the available list of roles, thereby increasing the number of roles. On the other hand Agent might be replaced by a wider Causer role which would then include such inanimate arguments as the *wind*. Both of these solutions have their drawbacks. Replacing Agent with Causer certainly solves the problem above by successfully including both *John* and the *wind* but consider the following sentences.

(38) John killed Bill.

(39) The freezing cold killed Bill.

(40) John murdered Bill.

(41) *The freezing cold murdered Bill.

In (39) and (41) the *cold* is much like the *wind* above, a natural phenomenon. These kinds of arguments are often referred to as natural agents. *Kill* can accept natural agents as its subject which makes (38) and (39) perfectly reasonable. *Murder* is however different from *kill* in that it demands of its subject that it act with intent. The *cold* is inanimate and cannot

do anything of its own volition, making (41) unacceptable. *Murder* requires a more specific role than Causer, its arguments have to possess volition because the act is intended. Causer is therefore overly general to pick out the subtle differences of meaning that seem to interact with syntax. The other solution, mentioned above, is adding Force to the list of roles. Force identifies inanimate arguments that cause the event described by the verb. This keeps the Agent role intact which seems to be necessary with verbs such as *murder*, but allows such arguments as the *cold* and *wind* to be properly identified. This way of dealing with the problem does have its disadvantage as well. The line of distinction between Agent and Force, according to Huddleston (1970, 505), is intention or volition, not animateness. This makes all Agents animate but Huddleston remarks that “either animates or inanimates could assume the Force role” which “raises new problems ... for it would follow that the majority ... of sentences with animate causers would be ambiguous” (1970, 505). *John* in (38) could therefore be either an Agent or a Force. The ambiguity most likely stems from the similarity of Agent and Force since both are kinds of causers. Cruse (1973) proposes that there is “a distinct possibility that agentives may be a definable sub-set of ‘doers’” (18). He determined that four semantic features lead to a positive result with a to-do test. Cruse’s Agent is therefore split into four types of Agent: volitive, effective, initiative and agentive. This fact, that Agent can be divided into more than one role, as pointed out by Huddleston (1970), “raises a further quite general problem” relating to Fillmore’s semantic roles, “namely that they are discrete non-complex symbols, so that they cannot be shown to have partial similarities” (506).

Fillmore’s (2003) assumes that “[t]he ‘explanatory’ use of this framework resides in the necessary claim that ... each [role] occurs only once in a simple sentence” (45). Huddleston (1970) and Dowty (1991) challenge this view since it “is arguable ... that there are empirical grounds for recognizing some simple sentences with two occurrences of a single case” (Huddleston, 1970, 510).

(42) John resembles Peter.

(43) Peter resembles John.

The examples above prove to be difficult for semantic roles because there doesn’t seem to be anything that distinguishes the two arguments of the verbs from each other. Dowty (1991) claims that there is “no apparent asymmetry in what is predicated of the two arguments on which to pin a distinction in role type” (556). Huddleston (1970) says they

are “semantically neutral in that there is ... nothing one can say about them ... other than that they are terms in the relationship identified by the “verb”” (510). Levin and Rappaport Hovav (2005, 43) do however point out that difference can be discerned between the arguments of *resemble*.

(44) Dorothy resembles the Mona Lisa

(45) ?Mona Lisa resembles Dorothy

The difference is awarded to the concept of a standard of comparison. In this case Mona Lisa is the definitive standard and saying that *The Mona Lisa resembles Dorothy* comes off as being odd. There are two problems that arise with this distinction of arguments. Introducing a semantic role for something as specific as standard of comparison which serves only to explain a particular class of roles goes against the assumption that roles should be few and general. Also, this kind of distinction is “perspective dependent” as Dowty (1991, 562-66) says, and it is not based on the event itself but on a speaker's interpretation of the event.

Huddleston (1970) as well as Jackendoff (1974) point out that arguments of certain verbs seem to take two roles. Consider the following examples which appeared in Jackendoff (1974).

(46) The rock rolled down the hill.

(47) Max rolled down the hill.

In (46) *the rock* is a Theme since it is the object that is moving. In (47) Max can also be a Theme but only if he is unconscious and does therefore not have any control over the situation. Max can however also be interpreted to be fully aware of himself and is perhaps very determined to roll himself down the hill. In that case he can be interpreted as Agent but he is also the Theme which is the entity that is moved by some action.

The examples included above are culled from extensive criticism and debate about semantic roles. Because it has proved so difficult to properly define the scope of each role that is relevant to argument realization there have been few attempts to assemble the definite list of roles. Where one linguist is happy with group of roles there seems to be another that begs for either finer or wider definitions of roles. Although the roles offer useful ways to label relations of participants to events it has proved difficult to adequately

link these relations to the syntactic realization of arguments. Tenny (1992) maintains that semantic structure and syntactic structures should be kept separate because linking the semantic roles themselves to syntactic phenomena has not proved to be satisfactory. Instead she proposes that aspectual factors offer a bridge between the semantic structure, offered by semantic roles, and the syntactic structure. The Aspectual Interface Hypothesis is therefore an attempt to provide a link between syntax and semantics.

3. Aspect

Aspect is the “study of how natural language expresses and organizes events in time” (Tenny 1995, 229). Arranging verbs in groups according to their aspectual properties has been traced all the way back to Aristotle but an often mentioned source for modern interest in aspect is Vendler (1957). Vendler classified verbs according to a “time schemata” which took into account various properties pertaining to the unfolding of events over time. These properties include the length of time an event can last and whether or not the event has a specific endpoint.

(48) John reached the summit.

(49) John played a sonata.

Both events have clear endpoints but the duration is different. Reaching the summit is the climber’s last step which exists between the 5 hour hike up the steep slope and leisurely drinking coffee on the top of the mountain. Playing a sonata is however more time consuming where the musician introduces some theme which is elaborated on and then resolved in an event that can take up to an hour. The event in (48) is characterized by Vendler as an *achievement* and the one (49) as *accomplishment*. In addition to these classes with specific endpoints he also suggested a third class of events with unspecified endpoints which is that of *activities*. *States*, the fourth class, do not describe action but “involve time instants in an indefinite and nonunique sense” (Vendler, 1957, 149.).

These classifications have been developed over the years with suggestions by researchers for some alterations but not in any major way according to Levin and Rappaport Hovav (2005) who point out that “there is not the same degree of proliferation of aspectual classes as there is of semantic roles” (88). On top of that there are “fairly well-

established tests for determining aspectual classification” (88). Linking aspectual properties to the distribution of arguments of verbs dates back to the early 1980’s but the first major theory on the role of aspect in argument realization was Carol Tenny’s Aspectual Interface Hypothesis.

4. The Aspectual Interface Hypothesis

Tenny (1992) observes that “there are strong generalizations to be made about correspondences between meaning and syntactic structure” but adds that “the problem is to how to constrain that interaction” (1). Linking semantic roles to syntactic positions has proven to be an inadequate way of properly constraining these correspondences. Instead of using semantic roles Tenny proposes “that certain aspectual properties mediate between syntax and lexical semantics” (2).

The mapping between thematic structure and syntactic argument structure is governed by aspectual properties. A universal aspectual structure associated with internal (direct), external and oblique arguments in syntactic structure constrains the kinds of event participants that can occupy these positions. Only the aspectual part of thematic structure is visible in the syntax.

(2)

The Aspectual Interface Hypothesis then maintains that aspectual properties make up the interface between syntax and semantics. Actual events are related to the concept of measuring out which, in active sentences, can only be a property of the direct internal argument of a verb. This is the core of the hypothesis but the specifics are laid out below.

[(50)] Measuring-Out Constraint in Direct Internal Arguments:

- (i) The direct internal argument of a simple verb is constrained so that it undergoes no necessary internal motion or change, unless it is motion or change which ‘measure out the event’ over time (where ‘measuring out’ entails that the direct argument plays a particular role in delimiting the event)
- (ii) Direct internal arguments are the only overt arguments which can ‘measure out the event’.
- (iii) There can be no more than one measuring-out for any event described by a verb.

[(51)] The Terminus Constraint on Indirect Internal Arguments:

- (i) An indirect internal argument can only participate in aspectual structure by providing a terminus for the event described by the verb. The terminus causes the event to be delimited.
- (ii) If the event has a terminus, it also has a path, either implicit or overt.
- (iii) An event described by a verb can have only one terminus

(Levin and Rappaport Hovav, 2005, 98)

The Aspectual Interface Hypothesis falls within the realm of event conceptualizations which according to Levin and Rappaport Hovav (2005) are attempts to define “which semantic properties of events influence argument realization” (78). This is essentially “a hypothesis about how language users conceptualize happenings in the world for linguistic encoding” (78). Consider sentence (52).

(52) Bill ate an apple.

Tenny explains how the direct object of the verb, the apple, can be converted into a time line.

The apple referred to by the direct object ... ‘measures out’ gradually the event described by the verb phrase. Someone who eats an apple progresses through the event in increments of apple. ... We may think of an event as a series of snapshots of the objects involved, at points along a time line. The snapshots record the property that is changing in the object. ... In the case of apple-eating there will be some snapshots in which the apple is gone ... It is the existence of this distinctive point of time, provided by some changing property of the object, that makes a delimited accomplishment.

(Tenny 1987, 77-78, cited in Jackendoff, 1996, 305-306)

4.1 Types of Events

Tenny defines three classes of verbs which each describe a type of event. The first type is an event-object homomorphism where the direct internal argument “defines a homomorphism from the physical extent of its own referent to the temporal progress of the event described by the ... predicate” (Levin and Rappaport Hovav, 2005, 93). In this case internal arguments, or the objects of verbs, provide the boundaries for the temporal extent of the event and they do it by referring to spatial extent or volume (Tenny, 1992, 6). In this case the argument that measures out the event has an inherent endpoint which Tenny refers to as delimitedness. The following sentences show examples of verbs in this class.

(53) John destroyed the city.

(54) John destroyed the city in an hour.

(55) John ate the apple.

(56) John ate the apple in an hour.

In these cases the progress of the event is linked to quantity of the object. Delimitedness is uncovered by adding temporal adverbial expressions such as *in an hour* as can be seen in (54) and (56).

Another type of event is the event-property homomorphism. In this case “the verb names that property of its argument which is to do the measuring” (Tenny 1992, 6). This is different from the event-object homomorphism in that “it is not the actual extent of the direct object which is relevant to delimiting the event, but rather a scalar property of the object such as its ripeness” (Levin and Rappaport Hovav 2005, 95).

(57) Ripen the fruit.

(58) Redden the photograph.

The third type of event is the event-path homomorphism where the path “measures out the event since the progress along the path determines the progress of the event, and its endpoint ... delimits the event” (Levin and Rappaport Hovav, 2005, 94).

(59) John climbed the ladder.

(60) Sue walked the Appalachian trail.

4.2 The Internal Argument Measures out Events

Tenny (1992) refers to an asymmetry between internal and external arguments which underscores the idea that only direct internal arguments measure out events. This asymmetry pertains to “the interaction of the aspectual properties of NP’s and VP’s”. In some cases, when “the internal argument is a count noun the event is delimited ... and when it is a mass noun it is nondelimited” (7).

(61) Charles drank a mug of beer in an hour.

(62) Charles drank beer for an hour.

In (61) the *mug of beer* is a count noun and the sentence is delimited but in (62) *beer* is a mass noun and so the sentence is nondelimited. This does however not hold with external arguments and whether or not the external argument is a count noun or a mass noun has no effect on the delimitedness of the event.

(63) The heater melted the candle in/*for an hour.

(64) Heat melted the candle in/*for an hour.

Nothing changes in relation to the delimitedness of the events in (63) and (64) even though the count noun *the heater* is exchanged for the mass noun *heat*. The same applies to the examples below where the mass noun *snow* and the count noun *trees* both yield delimited events.

(65) The snow surrounds the house.

(66) Seven trees surround the house.

4.3 Aspect vs. Affectedness

Affectedness is a semantic feature describing its argument as undergoing change which has been associated with syntactic forms such as middle formation and NP passivization (8).

(67) The mongols’ destruction of the city.

(68) The city's destruction by the mongols.

NP passivization is possible when the arguments are affected as can be seen in (68). However, when arguments are not affected the NP passivization doesn't seem to be an option.

(69) John's avoidance of Bill.

(70) *Bill's avoidance by John.

The fundamental factor in this, according to Tenny, is that affectedness of an argument is a temporal process which can be “more adequately described in aspectual terms, as an argument which measures out and delimits the event described by the verb” (8). This is an interesting observation because delimitedness of an argument can be applied to verbs which are not associated with affectedness so it “unifies a larger class of verbs having the same syntactic behaviors than does the idea of being affected by some action” (8).

(71) The company's performance of the play.

(72) The play's performance by the company.

(73) John's translation of the poem.

(74) The poems's translation by John.

A performance of a play and a translation of a poem do not affect the play and poem in the way the destruction of a city affects that city. The temporal delimitedness of the performance, translation or destruction is however shared by arguments of all three verbs. Tenny concludes that affected “arguments are a subset of the class of direct arguments; they are those arguments that not only measure out but also delimit the event” (10).

4.4 Unaccusative and Unergative Verbs

Unaccusative and unergative verbs are two types of intransitive verbs, i.e. verbs that take only one argument. This distinction is a syntactic one where the subject of unaccusative verbs is a derived form of subject, while the subject of unergative verbs could be

characterized as being an actual subject. The idea is that the underlying syntactic structures are different.

(75) Unergative: NP [VP V]

(76) Unaccusative: [VP V NP]

The NP that takes the subject position in unergative constructions is the external argument because it exists outside the maximal projection of the verb, shown by brackets in (75) and (76). The subject of unaccusative verbs is on the other hand derived from a NP that exists within the maximal projection of the verb and is therefore an internal argument.

Tenny notes that “there are strong general semantic tendencies associated with this syntactic distinction” (11). The Agent role has been associated with unergative verbs while a Patient or a Theme argument is generally associated with unaccusative verbs. *Martha* in (77) can be labeled an Agent while *the lake* in (79) is a Patient.

(77) Martha danced *in/for three hours.

(78) *Martha danced halfway.

(79) The lake froze in/*for three hours

(80) The lake froze halfway.

There is also an aspectual difference between these verbs that can be unearthed by applying the adverbial *halfway* and the prepositions *in* and *for* to these sentences. The event described in (77) is an activity which doesn't have any specific endpoint. There is nothing inherent about the event or the individual performing the action describe by the verb that constitutes a measurable quantity, path or property. This is in line with what the Aspectual Interface Hypothesis predicts, namely that only the direct internal argument can measure out events. The sentence in (79) tells a different story. This is an example of an event-object homomorphism. *The lake* refers to spatial extent and the verb refers to a progress which occurs over time. The internal argument, *the lake*, measures out the event as is indicated in (80), and the indirect internal argument, the object of the preposition *in* delimits the event as can be seen in (79). The internal argument

4.5 The Locative Alternation

The spray/load alternation is a special kind of locative alternation that involves alternating constituents within the verb phrase. The variant of the alternation in sentence (81) realizes a Theme, *paint*, as the object of the verb while a Goal, *the wall*, appears as the object of the preposition *on*. In (82) the Goal is however realized as the object of the verb and the Theme as the object of the preposition *with*.

(81) John sprayed paint on the wall.

(82) John sprayed the wall with paint.

This alternation requires specific semantic properties of the arguments of the verb. As Tenny (1992) notes, “the goal must be a flat surface or container, and the theme must be a material which is removed or applied to that surface or container” (14). The locative alternation is however not an option for all verbs that take Theme and Goal arguments, consider (83) and (84) below.

(83) John pushed a cart to San Francisco.

(84) *John pushed San Francisco with a cart.

Here *the cart* is a Theme while *San Francisco* is a Goal. This kind of evidence is difficult to explain by relying solely on the semantic roles suggested for these verbs. A kind of Goal would have to be made available, which includes concepts such as surface and container but excludes the kinds of Goals that designate the endpoint of a path. The Aspectual Interface Hypothesis offers an explanation as to why (83) is an option for *spray* but (84) is not an option for *push*. In Tenny’s (1992) words, “the direct internal argument is constrained to measure out the event described by the verb” (15). This is the case with (83) where *the wall* can be seen to measure out the event. *San Francisco* alternatively is more like a binary feature, either *John* and the *cart* have reached *San Francisco* or they have not. The direct Internal argument of (84) then does not measure out the event, which is a violation of the constraint, and explains why this is not an option for *push*.

4.6 The Instrument Subject Alternation

The instrument subject alternation has already been discussed in terms of semantic roles. It alternates between a sentence form which takes Agent as subject, Patient as object and Instrument as the object of a preposition and a different sentence form where the Instrument becomes the subject and the Patient remains the object. The argument acting as Agent is removed altogether. *The stick* in (85) becomes the subject of the verb in (86) and *John* is removed. Note that the direct internal argument, *the window*, is not altered at all. The constraints The Aspectual Interface Hypothesis puts on the internal argument doesn't appear to offer explanation for these different realizations of the subject.

(85) John broke the window with a stick.

(86) The stick broke the window.

The Aspectual Interface Hypothesis maintains that the direct internal argument is the only argument that can measure out events. Consider the sentences below.

(87) The window broke in a split second.

(88) John broke the window in a split second.

The preposition *in* can be used to highlight aspectual properties and, as is the case above, refers to the time frame within which the event can unfold. Granted, *break* doesn't offer a very wide time frame so the very limited *split second* is used here. There is a clear difference between the sentences above in that (87) refers to the very short time it took for *the window* to break but (88) does however describe the short time it took for *John* to break the window. The breaking of the window is a result of *John's* quick movement that occurs before *the window* breaks. To use Tenny's imagery, if snapshots were taken of the event in (88) they would show *John's* fist flying through the air, with ever decreasing distance from the *window* until it hits *the window* and breaks it. It could be argued that in the cases of (88) *John's* actions, the activity of the external argument, measure out the event. When the direct internal argument doesn't measure out the event it would seem that the property of measuring out could be transferred to the external argument.

Dowty (1991) offers an even more convincing example of an external argument measuring out the event.

(89) John entered the icy water.

(90) The crowd exited the auditorium.

Dowty maintains that the “meaning of these verbs treat the stationary threshold or boundary traversed (and the direct object referent) as a line or plane rather than a region” (571). It does appear that excluding the external argument from measuring out events restricts The Aspectual Interface Hypothesis from making assertions about the selection of subjects.

4.7 Objects not Subjects

As is evident from the Aspectual Interface Hypothesis it is mainly concerned with the objects of verbs. The unaccusative and unergative distinction, discussed above, deals with the selection of the appropriate object of the verb, the argument that measures out the event becomes the object. The locative alternation expresses the objects of the verb in different ways. The Aspectual Interface Hypothesis offers insight into why verbs select certain kinds of objects and under what conditions a certain type of argument is appropriate for the object position.

The Aspectual Interface Hypothesis is however unable to account for subject selection for verbs such as *break*. It is also inaccurate in predicting that only direct internal arguments should measure out events, as examples like (89) and (90) indicate. It would also seem that with less obvious examples such as (88) the external argument can be interpreted to measure out the event. It should be stated that the relation *John* has with *break* cannot easily be interpreted to fall under any of the event homomorphisms that Tenny defines but it still appears that the temporal progress, however slight, exists with *John*'s movement. By including the external argument as a candidate for measuring out The Aspectual Interface Hypothesis could be made to account for subject selection but how to implement this into the theory is unclear. There have however been developed aspectual theories that propose that subject selection is based on aspectual factors, the subject is then an initiator that marks the beginning of an event. Levin and Rappaport Hovav (2005) however point out that they do not offer insight into subject selection that hasn't been covered by concepts such as Agent.

5. Conclusion

Argument realization has been the source of much discussion relating semantic notions to syntactic phenomena. Semantic roles, as introduced by Fillmore (1968), offered a way to make assertions about the semantic nature of arguments of verbs and on those grounds make generalization about syntactic constructions. Semantic roles did however fail to adequately link syntax and semantics. Tenny's Aspectual Interface Hypothesis was developed to rigorously link semantic representation with syntactic realizations of arguments. It poses fairly simple constraints on the direct internal argument of a verb, namely that should measure out the event when undergoing change. This has proved useful in giving accounts of the realizations of the objects of verbs and their selectional restrictions.

The Aspectual Interface Hypothesis is however inadequate in giving account of subject selection such as in the instance of the subject instrument alternation. Examples where the external argument apparently measures out the event it seems that aspectual factors are not solely the property of the direct internal arguments of verbs. The Aspectual Interface Hypothesis would benefit from including the external argument as a candidate for measuring out and this might explain subject selection as well as the selection and expression of objects. It does however seem that this solution is not feasible. Where aspectual notions have been proposed as the a determining factor for subject, the insight gained from such attempts has not proved to add much to already much discussed concepts such as the Agent role.

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