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KENNETH LOCKE HALE
1934–2001

A Biographical Memoir by
MORRIS HALLE AND NORVIN RICHARDS

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Biographical Memoir

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Kenneth Hale

KENNETH LOCKE HALE

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BY MORRIS HALLE AND NORVIN RICHARDS

KEN HALE WAS A DESCENDANT of Roger Williams, the founder of Rhode Island, whose political and religious views led to his banishment from Massachusetts by order of the General Court of the Colony. Williams made special efforts to be on good terms with the indigenous Indians, and his 1643 book *Key into the language of America* is one of the earliest studies in English of a Native American language. Hale felt great affinity for his seventeenth-century ancestor, not only for the latter's interests in the language and culture of the indigenous population among whom he had come to live, but also for his radical political views.

Hale was six years old when his father, who had been a banker in Chicago, changed careers and became a rancher in Arizona. Growing up on the family ranch, Hale came in contact with speakers of Native American languages and discovered that he had an extraordinary talent for acquiring languages quickly and thoroughly, a talent that he was fortunate to retain throughout his life.

Hale did his undergraduate work in anthropology at the University of Arizona in Tucson. For graduate study he transferred to Indiana, where he worked with C. F. Voegelin, who had been an associate of Edward Sapir (NAS 1934).

Hale obtained his PhD in 1959 at Indiana University with a thesis *A Papago Grammar*. He then spent two years doing fieldwork in Australia, during which time he collected the basic linguistic data (morphology and core vocabulary) of around 70 languages and made a more intensive study of many of these. Hale's field notes and records of those years have served as the raw material for linguistic research at all levels, from numerous Master's and PhD theses written by students at universities in Australia and the US to the most advanced research currently underway.

Upon his return from Australia Hale taught at the University of Illinois at Urbana and at his alma mater, the University of Arizona. It was at this time (in the 1960s) that Hale became an active contributor to the work in transformational and generative linguistics that had been initiated by Noam Chomsky (NAS 1972) at MIT. This, in turn, led to his appointment in 1966 to the linguistics faculty at MIT, where he remained to the end of his life.

Hale was sensitive to the unequal relationship that often obtains between researchers, who usually have enormous material resources at their command, and the individuals whose languages are being studied, who often are barely surviving on the margins of our modern world. He was deeply concerned about "the sheer lethal incompatibility between the dominant Anglo-Saxon people's empire and an Aboriginal society of almost inconceivable antiquity,"¹ and he made major efforts to provide tangible benefits to the groups whose languages he was studying. In Australia, in Nicaragua, and particularly in the American Southwest, he was instrumental in starting programs in elementary education in several local languages. He tried in a great many instances to provide training to individuals from the groups whose languages he was studying, including admission to graduate programs in linguistics with financial support.

These efforts, alas, were less successful than Hale had hoped. Mainly as a result of political changes over the last quarter century, many of the educational programs Hale established lost financial support and had to be abandoned after a few short years, well before they could have worked their planned effects. These setbacks did not discourage Hale. They only clarified for him the great difficulty of the task, which he hoped would never be abandoned but would be continued by subsequent generations of linguists.

An essential part of the research in linguistics consists of the collection of appropriate data. In many cases this involves extensive one-to-one contact with a speaker of a particular language. This is especially true of languages without copious written records, where fieldwork with native speakers is the only means of gathering necessary data. Hale was justly famous among linguists as a superb collector of linguistic data.

However, data collection was never the primary goal of his work. For Hale, as for many modern linguists, the central aim of linguistics was the elucidation of the mental capacities of humans by virtue of which they are able to learn to produce and understand utterances in one (or more) languages. Like any other science, linguistics aims to go beyond the recording of facts to the discovery of the principles that govern these facts. One important result of the work of the last half century is the conclusion that the grammars of languages do not vary virtually without limit, as had been widely assumed; rather, the cross-linguistic differences that we find are all variations on a theme, with a common core of linguistic properties that appear to be universal in human language. On one widely held view (subscribed to by Hale and the authors), this linguistic uniformity is due to the fact that the computations involved in putting words together into sentences employ neurophysi-

ological machinery that is uniform in the human species. It is this machinery, sometimes called Universal Grammar,² that allows humans, but not chimpanzees, to learn English, or Warlpiri, or any other language, and it is due to the nature of this machinery in *homo sapiens* that human languages have certain properties and lack others. On this view, the subject matter of linguistics is the nature of the human mind, of this neurophysiological machinery which is part of what makes us human, as revealed in the patterns of the languages of the world. This approach to human language began with Noam Chomsky's pioneering work in the 50's, and has driven several decades of fruitful work in linguistics—work to which Ken Hale made profound and varied contributions.

Partly because of his talent as a polyglot, Hale was able to shed light on these profound questions of human nature by drawing on data from a phenomenal number of languages from all over the world. In addition to studies of the native languages of Australia and the American Southwest (especially Navajo, Hopi, and Tohono O'odham [formerly called Papago]), Hale's bibliography includes papers on two native languages of Nicaragua (Ulwa and Miskitu), on Irish, on Igbo, on Dagur (a language of Mongolia), on Hocak (Winnebago), on K'ichee' Mayan, and on numerous others. In what follows we have tried to present one of Hale's many contributions to linguistic theory in a manner accessible to readers without extensive familiarity with the technical literature. We must emphasize that Hale's contributions were so profound and far-reaching that we can discuss only a small fraction of them. We have picked a particular area in which he was active, and will go into this area in some detail, merely as an illustration of the impact of his work. It is our hope that the following pages provide those who have never been exposed to modern linguistics with

some insight into the problems and a few of the results of this area of scientific inquiry.

ONE OF HALE'S QUESTIONS: ARGUMENT STRUCTURE

A recurring theme in Hale's long and fruitful research career had to do with the nature of what linguists refer to as *argument structure*. This is the power of certain kinds of words (for example, verbs) to determine certain other aspects of the structure of the clause. Traditional grammar recognizes, for instance, that verbs may be *transitive* or *intransitive*, requiring or forbidding the presence of a direct object (here and below, examples marked with an asterisk, like (1b) and (2b), represent inadmissible sequences of words):

- (1) a. The dragon devoured the villagers.
 b.* The dragon devoured.
- (2) a. The knight fainted.
 b.* The knight fainted the danger.

Transitive verbs like *devour* require a direct object, while intransitive verbs like *faint* cannot occur with an object. In some cases, the demands imposed on the structure by the verb may be more elaborate than this; verbs like *put*, for example, require the presence not only of a direct object but of a locative prepositional phrase as well, as (3) shows:

- (3) a. The dragon put the villager upon the plate.
 b.* The dragon put the villager.
 c.* The dragon put upon the plate.

In all of these examples, the argument structure is determined by the verb. Once the role of verbs in determining argument structure is recognized, a host of questions arises. What kinds of verbs can there be? We have seen

above that verbs like *devour* require direct objects, and verbs like *put* require locative prepositional phrases as well as direct objects. Are there any limits on the kinds or numbers of things that verbs can require? Must the properties of argument structure be restated for each language, or are there principles that hold universally?

One of the important results of the work of the last half century is that the properties of argument structure across languages do not simply vary without limit, but are narrowly constrained by general principles of Universal Grammar. This is particularly interesting, since argument structure interacts with an aspect of linguistic knowledge that is plainly not universal, namely the properties of the individual words of the language. Part of the task of a child learning her first language is to learn the vocabulary. But, what does “learning the vocabulary” entail? At a minimum, a child learning English must learn, for example, that the word pronounced *faint* can be a verb with a particular meaning (something like “lose consciousness”). Here Universal Grammar is clearly of no help, as the pairing of sound and meaning is arbitrary; no universal principles predict that the word with this pronunciation ought to have this meaning rather than a different one. As (2) shows, any English speaker also knows at least one other fact about *faint*, namely that it is intransitive (that is, that it cannot have a direct object). Is this an independent fact that must be separately learned? Or does it follow from other properties of the verb’s meaning? This puzzle is one of many to which Hale contributed answers.

Let us consider the nature of transitivity somewhat more closely. There are verbs in English that differ from the ones considered above in that they can appear either with or without an object (that is, they may be either transitive or intransitive):

- (4) a. The ice melted. [intransitive]
 b. I melted the ice. [transitive]
- (5) a. The pot broke. [intransitive]
 b. I broke the pot. [transitive]

By contrast, the intransitive verbs in (6-7) lack transitive counterparts:

- (6) a. The baby laughed. [intransitive]
 b. *I laughed the baby. [transitive]
- (7) a. The engine coughed. [intransitive]
 b. *I coughed the engine. [transitive]

With respect to their argument structure, verbs fall into at least three classes: transitive (1), intransitive (6-7), and alternating (4-5). Argument structure is one of many complex aspects of language that we use instinctively. English speakers do not make mistakes about the facts in (1-7); English classes in high school do not dwell on them, and they are not discussed in popular newspaper columns about language. Because our mastery of these facts is so effortless, it is easy to assume that the explanation for these facts must be straightforward. We might think, for instance, that (6b) and (7b) are impossible because the sentences in question are meaningless.

But the problem with (6b) and (7b) is not a straightforward semantic one. It is easy to imagine what a sentence like (6b) could mean if it were grammatical (something like “I caused the baby to laugh,” just as (4a) roughly means “I caused the ice to melt”). (6b) cannot mean this, however; such meanings must be expressed via more complex

syntactic structures involving multiple verbs, like the ones in (8):

- (8) a. I made the baby laugh.
 b. I made the engine cough.

Moreover, as Hale never failed to note, these are not parochial facts about English. Navajo, for instance, has a class of intransitive verbs that add a prefix ʔ to form their transitive versions:

- (9) a. Tin yí-yíí'
 ice 3 melt.PERF
 'The ice melted'
 b. Yas yí-ʔ-híí'
 snow 3.1s ʔmelt.PERF
 'I melted the snow'
- (10) a. Tóshjeeh si-ts'il
 barrel 3 shatter.PERF
 'The barrel shattered'
 b. ʔeets'aa' sé-ʔ-ts'il
 dish 3.1s ʔshatter.PERF
 'I shattered the dish'

With another class of verbs, the transitive cannot be formed so simply; this latter class includes Navajo verbs like the ones meaning *laugh* and *cough*. With these verbs, more complex structures, roughly analogous to the English ones in (8), must be used to express causation of the event.

We find a very similar situation in Miskitu, a Misumalpan language of eastern Nicaragua and Honduras on which Hale did extensive work. In this language, there is a class of verbs that may appear in either transitive or intransitive forms (with the difference indicated by a suffix); these include the verbs for *melt* (transitive *slil-k*, intransitive *slil-w*)

and *break* (transitive *kri-k*, intransitive *kri-w*). And, again, just as in English and Navajo, there are verbs that may only be intransitive, including the verbs for *laugh* (*kik*) and *cough* (*kuhb*).

In all three of these unrelated languages, then, some intransitive verbs may be made transitive, while others may not. Moreover, the particular verbs that fall into these classes are startlingly similar across languages, as we see in the charts below:

(11) VERBS THAT CAN BE TRANSITIVIZED

<u>English</u>	<u>Miskitu</u>		<u>Navajo</u>	
	<i>intransitive</i>	<i>transitive</i>	<i>intransitive</i>	<i>transitive</i>
boil	pya-w-	pya-k-	-béézh	ʔ-béézh
break	kri-w-	kri-k-	-ii-dʔaad	-ii-ʔ-dlaad
crack	bai-w-	bai-k-	-ii-ts'il	-ii-ʔ-ts'if
dry (up)	lâ-w-	lâ-k-	-gan	ʔ-gan
fill	bangh-w-	bangh-k-	ha-di-bin	ʔha-di-ʔ-bin
float	â-w-	â-k-	di-'eeʔ	di-ʔ-'eel
melt	slil-w-	slil-k-	ghíí h	ʔ-ghíí h

(12) VERBS THAT CANNOT BE TRANSITIVIZED

<u>English</u>	<u>Miskitu</u>	<u>Navajo</u>
cry	in-	-cha
cough	kuhb-	di-l-kos
laugh	kik-	ghi-dloh
play	pul-	na-né
shout	win-	di-l-ghosh
sing	aiwan-	ho-taał
sleep	yap-	i-ł-ghosh
snore	krat-w-	i-ł-ghá á'

As the charts show, all three of these unrelated languages have transitivity alternations in their words for *boil*, *break*, *crack*, *dry up*, *fill*, *float*, and *melt*, while all of them lack transitivity alternations of the same type in their words for *cry*, *cough*, *laugh*, *play*, *shout*, *sing*, *sleep*, and *snore*. As we saw in (8) above, the problem is not a straightforward semantic one, since it is clear what the transitive versions of these latter verbs would mean—yet the fact is that they cannot be made to mean this.

We are confronted, then, with a question: what constrains the ability of verbs to alternate between transitive and intransitive versions? We have seen that the answer to this question cannot be based on facts that are peculiar to English; what is needed is a theory that predicts that a verb that means *cough*, whatever language it finds itself in, will be unable to take a direct object, while a verb that means *float* will be able to do so.

In several decades of collaborative research with our colleague Samuel Jay Keyser, Hale developed a solution to this puzzle which has become standard in the field. Their answer to the puzzle is based on the idea that these verbs have a more complex structure than is immediately apparent. In particular, they attributed this more complex structure to the second, non-transitivizable type of intransitive verb (including verbs with meanings like *laugh* and *cough*). In order to explain their proposal, we will need to consider some general properties of the structure of words, and how they can vary cross-linguistically.

To begin with, words are not always atomic; they can consist of smaller parts, referred to as morphemes. Thus, the English words *un-faith-ful-ness* and *trans-it-iv-iz-able* are each composed of several morphemes, here separated by hyphens; similarly, the Swahili verbs below each consist of four morphemes, a verb preceded by three prefixes:

- | | | | |
|------|------------------|------------------|-----------------|
| (13) | a. ni-li-ki-pata | I PAST it get | 'I got it' |
| | b. wa-li-ki-pata | they PAST it get | 'They got it' |
| | c. ni-ta-ki-pata | I FUTURE it get | 'I will get it' |

We can determine how these verbs are decomposed into morphemes by comparing minimally different pairs of words and observing the changes in meaning and form. (13a) and (13b), for instance, differ in form only in their first syllable (*ni-* vs. *wa-*), and differ in meaning only in their subject (*I* vs. *they*). We can tentatively conclude, then, that this first syllable is a morpheme, a prefix that indicates the identity of the subject—and further research into Swahili would back this up. Similarly, (13a) and (13c) differ only in their second syllables, and in tense, and we can rightly conclude that this second syllable is a prefix denoting tense. The study of morphemes, and the rules of their combination, is called morphology.

Two results from the study of morphology are of interest to us. One has to do with a cross-linguistic morphological difference. Languages vary in how much material may be put in a single word; we often find that one language communicates with a single word what another language requires several words to express. The Mohawk verb in (14a), for example, has the same meaning as the English sentence in (14b):

- (14) a. Wa'-ke-nakta-hnínu -'
 PAST I bed buy PUNCTUAL
 b. I bought a bed.

As we can see in (14), Mohawk allows a verb and its object (here *hnínu* 'buy' and *nakta* 'bed') to become parts of a single word; in English the verb and its object must be separate words in this case.

The other fact about morphology that is relevant for our purposes is that morphemes may sometimes be inaudible. In English, for instance, the past tense on verbs is most commonly marked with a suffix *-ed*, but some verbs fail to take this suffix, taking a null suffix instead:

- (15) a. play-*ed* (e.g., 'The band played yesterday')
 b. put-∅ (e.g., 'The dragon put the villagers on the plate yesterday')

We can convince ourselves that there is in fact a past-tense morpheme in (15b) by considering the negative forms of these verbs. As shown in (16), negation in English is expressed with the word *not*, and if no auxiliary is present, the word *not* is preceded by the verb *do*. Moreover, this auxiliary *do* always takes whatever morphology the main verb would have taken if negation were not present:

- (16) a. play-*ed* → a'. di-*d* not play
 b. play-*s* → b'. doe-*s* not play

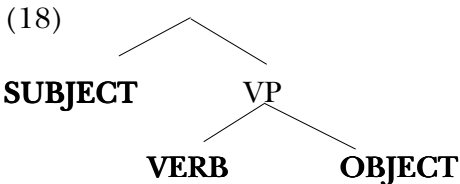
The main verb *play* is bare (suffix-less) in the negated examples in (16a') and (16b'); the morphology that would appear on it if negation were not present (-*ed* in [a'] and -*s* in [b']) appears on *do* instead. We can use negation, then, to see what kind of morphology appears on an English verb; whatever morpheme it is, it should appear on *do* when the verb is negated. Applying this diagnostic to *put*, we see that this verb does have a past tense morpheme attached to it when it is in the past tense, although this morpheme idiosyncratically fails to be pronounced on this particular verb:

- (17) a. put- \emptyset \rightarrow a'. di-*d* not put
 b. put-*s* \rightarrow b'. doe-*s* not put

The past tense morpheme is not the only unpronounced morpheme in English; another such morpheme is the plural suffix on nouns like *sheep* and *moose* (we say “three sheep” or “five moose” but “three dogs” and “five cats”).

We have seen that words can consist of smaller pieces called morphemes; that languages can vary in whether they leave these morphemes as free-standing words or combine them into a single word; and that morphemes may be unpronounced. Let us end this section with one further observation about the nature of sentences: The words in a sentence are not simply concatenated, but are put together in hierarchical structures.

A clause containing a transitive verb, for example, has a tree structure (diagram) something like that shown in (18):



In this tree, the verb does not have the same kind of structural relationship with the subject that it has with the object; in particular, the verb and the object form a unit (labeled “VP”, for “verb phrase”, in the tree in (18)) which excludes the subject. This way of depicting the structure allows us to account for the fact that the verb and its object are treated as a unit by a number of syntactic operations, unlike the verb and its subject. We will give just one such operation as an example. The sentences in (19) are all more or less synonymous, with the differences between them having to do with emphasis:

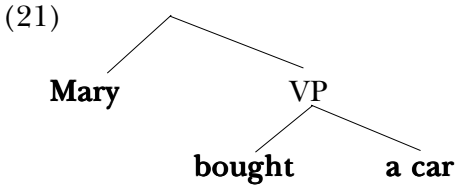
- (19) a. Mary bought a car.
 b. The one who bought a car was Mary.
 c. What Mary bought was a car.
 d. What Mary did was buy a car.

(19b-d) are all instances of what are known as pseudoclefts. Pseudoclefts are used to emphasize some particular part of the sentence. (19b), for instance, involves emphasis on Mary; this is the kind of sentence that might be uttered to contradict someone who had just asserted that John had bought a car. The emphasized material is placed at the end of the sentence, after the copula; in what follows, we will say that this post-copular material (i.e., *Mary* in [19b], and *buy a car* in [19d]) has been pseudoclefted.

The interesting property of pseudoclefts, from a linguist’s perspective, is that pseudoclefting does not simply affect any randomly chosen string of words. (19b) above involves pseudoclefting of the subject (i.e., *Mary* is the subject of the verb *bought*); (19c), pseudoclefting of the object, and (19d), pseudoclefting of the entire verb phrase—that is, of the verb together with its object. It is, however, impossible to pseudocleft the subject together with the verb:

(20) *What did a car was Mary buy

This property of pseudoclefts may be captured straightforwardly if we recognize that (19a) is not simply a string of words, but a hierarchical structure like the one depicted in (21).



Associating the words of this sentence with a tree of this kind amounts to a claim about which word sequences are units that syntactic operations may affect; in particular, it illustrates that only sequences that are exhaustively dominated by single nodes in the tree are syntactic units. There is such a unit that consists of the string of words *bought a car*; this is the VP, which is connected by lines which point down from it to these words, and to no others. But there is no such unit connected just to the words *Mary bought*.

This approach represents the argument structure of a verb in terms of syntactic structure; words are organized into hierarchical structures, represented above as trees, and the properties of these structures are partly determined by the verbs that appear in them. A speaker's knowledge of a word consists not only of knowledge of the word's sound and meaning but also of its argument structure (i.e., the place occupied by the word in tree structures like the ones above). Some of the most important advances in linguistics that have been made during the last half century by Hale and others involve operations on the argument structures of words and sentences. Since these computations reflect

claims about computations performed by actual speakers in producing actual sentences, the question may well arise as to the nature of the neurophysiological substrate of these computations. Our answer must be that at this time very little is known about this matter. This aspect of the present situation in linguistics is comparable to that of chemistry in the middle of the nineteenth century, where many aspects of chemical compounds were explained in terms of valence even though the physical basis of valence was not properly explained until many decades later (by Linus Pauling [NAS 1933]). In fact, as a result of the work of the last half-century we now have a different and much richer picture of the nature of argument structure than ever before. We see these discoveries as providing boundary conditions that the neurology of the future must satisfy.

HALE'S ANSWER: DERIVED INTRANSITIVITY

We can now consider Hale and Keyser's proposal about the nature of the untransitivizable intransitive verbs (e.g., *laugh*, *cough*). Their proposal is that verbs of this type have a more complex structure than is immediately apparent. A verb like *laugh*, on their view, has an underlying structure something like that of *do a laugh*, consisting of a transitive verb with a meaning like *do* that takes a noun *laugh* as its object (cf. *do a handstand*, *do a double take*). The verb *laugh* differs from the phrase *do a laugh* in two respects, both of which relate to properties of morphology that we have just discussed. One is that, like the Mohawk verb *wa'kenaktahnínu* 'I bought a bed' in (14a), the verb *laugh* in English combines into a single word the morphemes that remain separate in the phrase *do a laugh*. The other is that several of the morphemes that combine to make the verb *laugh* are unpronounced in English; in fact, the only morpheme that we hear pronounced is *laugh*, which is ac-

tually the direct object of an unpronounced verb meaning *do*.

This idea came to Hale and Keyser from their observations about the nature of these verbs in a variety of languages. In Basque, for instance, the composite nature of verbs of this type is obvious, since the relevant verbs consist of a nominal element attached to a verb *egin*, which means something like ‘do’:

- (22) a. *negar egin* cry do ‘cry’
 b. *barre egin* laugh do ‘laugh’

In other words, verbs like *laugh* and *cry* in Basque involve expressions not unlike *do a handstand* or *do a dance* in English. Such expressions describe an action in the way that a verb would, but the verb itself contributes little to the meaning of the expression, which mostly comes from the noun associated with the verb.

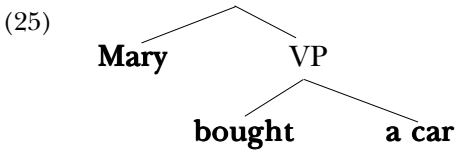
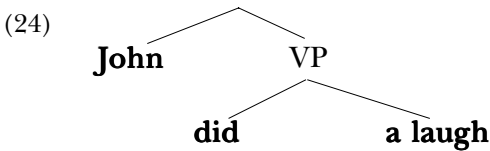
Similarly, in languages like Navajo (and in English, for that matter), this kind of verb is often transparently related to a corresponding noun:

- (23) a. *ghi-dloh* ‘laugh (v.)’
 b. *dlo* ‘laugh (n.)’
 c. *di-zheeh* ‘spit (v.)’
 d. *-zhéé’* ‘spit (n.)’

Hale and Keyser’s solution to this problem involves attributing to these verbs meanings (and argument structures) something like *do laughing* or *do spitting*. These verbs have a complex argument structure that is effectively that of transitive verbs, consisting internally of a verb (like *do*) with a nominal object (like *laughing*, *spitting*). Because they are already transitive, they cannot be “transitivized” as other, truly intransitive verbs can. “He laughed the baby,” in this

view, is unacceptable for the same reason that “He did a dance the lady” would be.

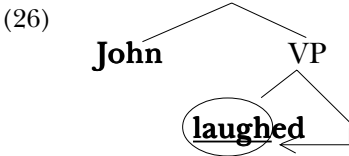
Hale and Keyser’s claim about the argument structure of a verb like *laugh* is a claim about the kinds of tree structures in which this verb may participate. According to Hale and Keyser, *John laughed* is to be associated with a tree very similar to the one in (21) above—repeated here as (25)—for *Mary bought a car*:



In (24), as in (25), the verb phrase consists of two main elements, a verb and its object. The claim made and defended by Hale and Keyser is that some verbs—in particular, verbs of the *laugh* class—are stored in speakers’ memories with complex structures of this type. In their approach, such verbs are not simply atomic units; rather, they consist of a verb with little semantic content (referred to in the literature as a “light verb,” and represented here with the English verb *did*), combined with an object that contributes much of the meaning of the verb (in this case, *laugh*).

In a language like Basque this is a straightforward representation of how these verbs appear in sentences (cf. (22)). In English, a special, language-particular condition affects the way this transitive verb is incorporated into the struc-

ture of a sentence. In English the object of this verb must become part of the verb, obscuring its underlying transitivity:



This account of Hale's requires us to be willing to entertain the possibility that the structure of a sentence of English (or Navajo, or Miskitu) might not be exactly what it appears to be. In this particular case, the facts of Basque suggest that some apparently intransitive predicates are in fact transitive; and, as Hale pointed out, if we make the assumption that all languages, including English, share this property of Basque, we arrive at a straightforward explanation for why such verbs cannot be made transitive. In Basque, the transitive nature of these verbs is obvious, while in English, it has to be inferred by the study of phenomena like transitivization.

Hale's account thus applies lessons learned from the study of Basque to the analysis of English, Navajo, and Miskitu. This kind of move, and the empirical success to which it has led, is one of the triumphs of an idea to which we alluded earlier: Underlying the obvious diversity of human languages are some invariant principles, which reflect the fact that all humans employ the same neurophysiological machinery to speak and understand what others say. Since all of us share the same neurophysiology, it is hardly surprising that all languages are constructed on principles of a single kind, those of Universal Grammar. Hale and Keyser's proposal is that properties of Universal Grammar guarantee that verbs with meanings like *laugh* and *spit* will be, on some level, transitive verbs.

The account that Hale and Keyser develop is based on an approach to argument structure that is dynamic rather than static. In this approach, the computation of a sentence involves multiple steps, and the answer to a question like “is this verb transitive?” can change in the course of the computation. Principles of Universal Grammar determine that in all languages, verbs with the meaning of *laugh* will be stored in the memory of the speaker as transitive verbs, involving a structure something like that of (27):

(27) John did a laugh

Hale and Keyser thus argue that it is possible for a verb that is transitive in the mental lexicon of the speaker to become intransitive when it is made part of a sentence. Statements about the argument structure of verbs, then, will have to be made with this possibility in mind; we cannot simply declare a verb to be ‘intransitive’, without stating whether we are discussing the representation of that verb in the speaker’s memory or its (potentially distinct) representation as part of the syntactic structure of a sentence. In what follows we will refer to verbs like *laugh* as underlyingly transitive (that is, transitive in the speaker’s memory) but surface intransitive in a language like English (where such verbs are made intransitive as part of their incorporation into the structure of a sentence.) In Basque, by contrast, these verbs are both underlyingly transitive and surface transitive. Similarly, it will be useful for us to distinguish between the underlying object and the surface object of a verb; *laugh*, for instance, has an underlying object in its representation in the speaker’s memory, but no surface object in a language like English (while in Basque, the underlying object of this verb is also its surface object). In the

same way, we will refer to verbs as having underlying subjects and surface subjects.

TYPOLOGIES OF VERBS

Hale then turned to the next logical question: What are the aspects of meanings like *laugh* and *cough* which determine that verbs with these meanings will be underlyingly transitive? To answer this question, we must consider the nature of the process of transitivity that can apply to verbs like *break* and *melt* (cf. (4-5)); what exactly is happening to these verbs?

- (28) a. The hammock broke.
b. Mary broke the hammock.
- (29) a. The butter melted.
b. John melted the butter.

Hale was able to build on a long tradition of syntactic work on alternations like those in (28-29). The meanings of the (a) and (b) sentences above are clearly connected; for the (b) sentences to be true, the (a) sentences must also be true. But the (b) sentences add another item of information; they tell us who is responsible for causing the event described by the (a) sentences. It would seem that making these verbs transitive involves adding a subject, who is described as causing an event to happen: *Mary*, for example, in (28b), and *John*, in (29b).

This is not how we are used to thinking about transitivity; normally, verbs are described as transitive or intransitive depending on whether they have an object. And it is true that the intransitive (a) sentences above lack an object, while the transitive (b) sentences have one. But this way of describing the situation overlooks an important fact:

the subjects of the (a) sentences above are the objects of the corresponding (b) sentences.

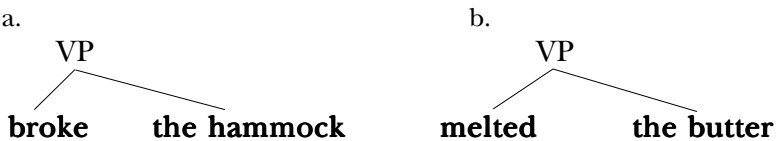
Why is *the hammock* the subject of (28a), but the object of (28b)? We have just offered the hypothesis that transitivity involves adding a subject that causes the event to happen, and this hypothesis answers part of this question; transitivity causes *Mary* to be the subject of (28b), which means that *the hammock* must be the object, since (for reasons that we will not try to explore here) there cannot be two subjects. But if *the hammock* is the object of (28b), why is it not also the object of (28a)?

The perhaps obvious answer is that if *the hammock* were the object of (28a), the resulting sentence would lack a subject:

(30) *broke the hammock

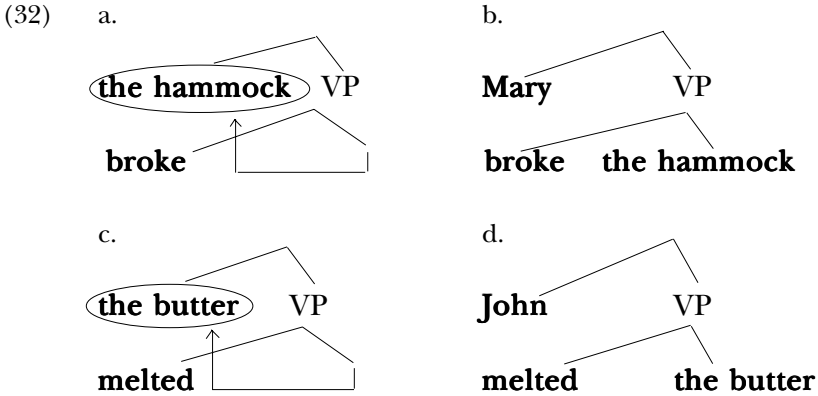
In fact, there are no grammatical English sentences without a subject. Apparently there is some principle requiring all clauses (of English, at least) to have subjects, and (30) violates this principle. We can posit that *the hammock* is the subject of (28a), not because of properties of the verb *break*, but simply because the clause must have a subject and *the hammock* is the only available noun phrase. Verbs like *break* and *melt* invariably take an underlying object, which denotes something that has undergone a change of state as a result of the event described by the verb:

(31)



In (28a) and (29a), these underlying objects (*the hammock* and *the butter*) have been forced to become surface

subjects, since the clauses must have surface subjects and no other noun phrases are present. In the (b) sentences, transitivity has provided an alternative subject (*Mary* and *John*, respectively), allowing the underlying objects of these verbs to retain their object status:



This conclusion about the nature of the intransitive verbs of this class—that their surface subjects are actually underlying objects—has a long tradition in syntactic theory, and is richly supported by data gathered by Hale and others from a variety of languages. One English piece of evidence comes from the behavior of what are called *resultatives*, some of which are exemplified in (33) (the resultatives are italicized):

- (33) a. They pounded the metal *flat*.
 b. She smashed the vase *into smithereens*.

The examples in (33) involve some object changing state; the resultative denotes its new state. For instance, in (33a), the metal goes from being non-flat to being flat. In transi-

tive sentences, resultatives invariably denote the new state of the object; sentences like the ones in (34) sound odd:

- (34) a.* They pounded the metal *sweaty*.
 b.* She smashed the vase *very satisfied*.

(34a), for example, cannot be used to mean that they pounded the metal until they became sweaty.³ Resultatives, then, apparently have some kind of privileged relation with the direct object, which we have stated in (35):

- (35) A resultative denotes the end state of the direct object.

However, we have now seen that identifying nouns as direct objects of verbs is not entirely straightforward; in the terms introduced above, we need to distinguish between underlying objects and surface objects. For instance, a noun may start as a direct object and then become something else (such as the subject, or part of the verb), yielding an apparently intransitive verb on the surface. In a theory that posits syntactic operations of this kind, we need to find out whether terms like “direct object” in (35) refer to underlying objects or to surface objects. Let us consider the interaction of these resultatives with the different types of intransitive verbs.

We considered two of Hale’s arguments above for the conclusion that some intransitive verbs have an underlyingly transitive structure; first, these verbs are transparently transitive in languages like Basque, and second, the assumption that these verbs are underlyingly transitive in languages like English makes it possible to explain why such verbs may not be transitivized. This kind of reasoning, drawing information from one language to shed light on the mysteries of another, was one of Ken Hale’s greatest talents. On the view embodied in this kind of work, different languages

offer windows onto different parts of a single puzzle, namely the nature of the human language faculty.

We must be careful not to overlook differences among languages when they do arise, and the reader may be concerned that we have been too quick to conclude that English and Basque have deep syntactic properties in common. In fact, the behavior of resultatives offers a new kind of argument for the conclusion that in English, as in Basque, some apparently intransitive verbs are underlyingly transitive. If we consider the behavior of resultatives in intransitive sentences, we find two major types. For one type, resultatives cannot appear at all:

- (36) a.* I laughed hoarse.
b.* She coughed dizzy.

These sentences do not have resultative readings; for instance, (36a) cannot mean that I laughed until I became hoarse. For a second class of intransitive verbs, the resultative denotes the end state of the subject:

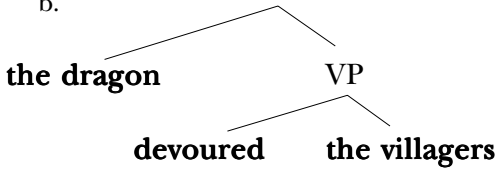
- (37) a. The vase broke *into smithereens*.
b. The butter melted *into a puddle*.

These are the two classes of intransitive verbs that Hale and Keyser are concerned with; verbs like *laugh* and *spit* underlyingly have direct objects that ultimately become part of the verb, while verbs like *break* and *melt* have direct objects which change into subjects. The facts in (36-37) follow, and are instances of the condition in (35). In (36), the resultative attempts to modify the subject, in violation of (35). In (37), by contrast, (35) is satisfied because the subjects to which the resultatives apply are underlying objects. We may state (35) more precisely as (38):

- (38) A resultative denotes the end state of the underlying object.

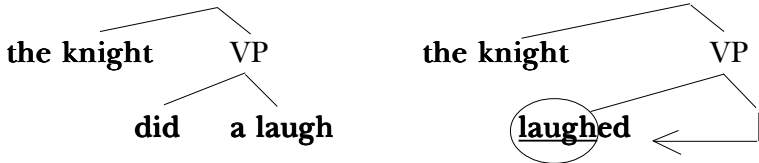
To summarize, then, Hale and Keyser posit three major types of verbs. Ordinary transitive verbs have both a subject and an object:

- (39) a. The dragon devoured the villagers.
b.



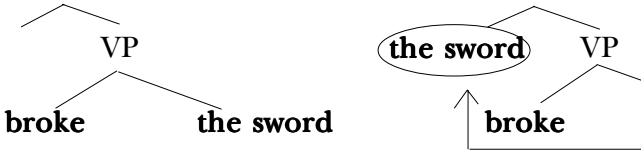
In addition, we find two categories of verbs that appear to be intransitive in English. Hale and Keyser posit one set of verbs (including *laugh* and *spit*) that are underlyingly transitive with a 'light' verb that contributes little to the meaning of the clause. For these verbs, the underlying object of the verb becomes part of the verb, yielding a surface intransitive verb:

- (40) a. The knight did a laugh → The knight laughed.
b.



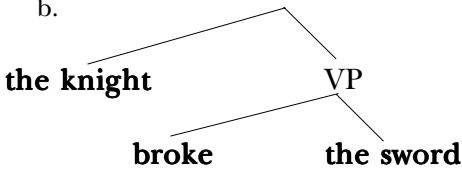
Finally, there are verbs that underlyingly have no subject at all (*melt* and *break*.) The underlying object of such verbs must become the surface subject, satisfying the requirement in English that all clauses have a surface subject:

- (41) a. broke the sword → The sword broke.
 b.



Transitivization, then, involves adding an agent responsible for causing an event to take place, which becomes the surface subject of the clause:

- (42) a. The knight broke the sword.
 b.



A subject can be added to verbs like the one in (41), but not to verbs like the ones in (39-40), which already have underlying subjects. The account therefore correctly divides surface intransitive verbs into two types; verbs like *break*, which can be transitivized by adding a subject, and verbs like *laugh*, which are in fact already transitive and therefore cannot be transitivized.

Hale's typology of verbs involves two main principles (43), and at least three processes (44) that sometimes make discovering these principles difficult:

- (43) a. All verbs must have underlying objects.
 b. All clauses must have surface subjects.

- (44) a. In English, light verbs sometimes ‘absorb’ their underlying objects: *laugh*, for example, in (40).
 b. ‘Transitivization’ adds an underlying subject to a verb that lacks one: *The knight broke the sword* in (42).
 c. If a verb has no underlying subject, the underlying object may become the surface subject, as in *The sword broke* in (41).

We can return now to the question with which we began this section. We have seen that *break*, in a sentence like (41), combines with a single noun phrase that starts out as its underlying object, before later becoming its surface subject. With verbs like *laugh*, on the other hand, the surface subject—*the knight*, in (40)—is also the underlying subject (that is, these verbs are stored in the speaker’s memory as requiring subjects). Why do these verbs differ in this way? What is it about *break* and *laugh* that causes them to behave syntactically as they do? We have seen that the behavior of these verbs is remarkably consistent across languages, so our answer should not simply be that the verbs are arbitrarily classified, as exhibiting this particular behavior.

A better answer to this question may be inferred from the nature of transitivization. We have seen that this operation adds an underlying subject, which is the agent responsible for causing an event to take place. A crucial difference between *laugh* and intransitive *melt* is that laughing is something an individual can do on purpose, while melting is not—that is, the subject of *laugh* is an agent, unlike the subject of *melt*. Hale claimed that this fact about the meanings of *laugh* and *melt* has repercussions for the way these verbs are associated with syntactic structure. Only agents, in his view, may be underlying subjects; non-agents may become surface subjects, but must be underlying non-subjects.

Hale’s proposals about argument structure are proposals about the nature of Universal Grammar. To Hale, all of us are born knowing general principles like (43a) and the

requirement that underlying subjects be agents. No matter what language a young child is acquiring, she is able to correctly deduce that the single argument of a verb with the meaning of intransitive *break* must be an underlying object. Since it is not an agent, it cannot be an underlying subject, and it becomes a surface subject only because of a requirement that the clause have a surface subject.

This approach succeeds in reducing to a minimum the task faced by children learning the vocabulary of their native languages. As we mentioned above, the mapping between sound and meaning varies arbitrarily across languages; there are no principles of Universal Grammar that guarantee that a verb pronounced *break* must mean what *break* means in English. Clearly, learning a word must involve learning its pronunciation and its meaning; Universal Grammar is of no help in these tasks. What Hale established is that once the child has learned what a verb means, she has also learned its argument structure. Having learned what *laugh* means, for instance, she is in a position to conclude, on the basis of conditions like those in (43-44), that it is underlyingly transitive, and cannot be straightforwardly transitivized. The argument structure of words need not be learned independently, but follows from the general principles that map meaning onto structure. If Hale is correct, then a number of questions arise. Why must clauses have surface subjects? Why must verbs have underlying objects? What properties of agents constrain their syntactic behavior? It is perhaps one of Ken Hale's greatest legacies that he left us with questions like these to answer.

Hale's proposals about these general principles are proposals about the nature of the human mind. Part of what it is to be a human being is to have a mind that constructs grammars incorporating the requirements in (43), and every normal human being is born with such a mind. Ulti-

mately, of course, we would like to have a theory that explains how principles like the ones in (43) are implemented in the neurophysiology of the brain, and work intended to develop such explanations is under way. Hale's career is a testament to the fact that one can make progress on questions about the properties of the mind without directly investigating the implementation of those properties in the brain. In fact, it would be impossible to develop such theories of neurological implementation without a clear understanding of what is to be implemented, and as we have tried to show, the properties of human grammar are more complex than they might appear at first sight. Our understanding of these complex properties owes an enormous debt to Hale's work.

Limitations of space and time make it impossible for us to fully describe the extent of Hale's many other contributions to linguistic theory. Hale worked on historical reconstruction of the Australian language families, on intonation in Tohono O'odham, on stress in Hocak, on agreement in Irish and K'ichee,' on the phonology and semantics of a sacred initiation language of the Lardil called Damin, and on countless syntactic issues in languages from Warlpiri to Dagur to Navajo. He produced dictionaries of Lardil and of Ulwa, and contributed extensively to a dictionary of Warlpiri, and to educational materials in countless other endangered languages. He was the first, and in many cases, the only researcher to document the vocabulary and structure of dozens of aboriginal languages of Australia. He lived the kind of life that no set of writings can do full justice to. He was a great man, and we count ourselves fortunate to have known him and worked with him.

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NOTES

1. J. Simpson, D. Nash, M. Laughren, P. Austin, and B. Alpher. Forty years on: Ken Hale and Australian Languages. *Ogmios* 2.5, no 17, summer 2001, p.3
2. The name is perhaps an unfortunate one, since it is not intended to refer to the grammar of any particular language, but rather to properties which universally hold of human languages.
3. (34a) may have another, irrelevant reading, in which they pounded the metal while they were sweaty, with no change of state implied. This reading treats sweaty not as a resultative but as a *depictive*, which is subject to different conditions.

SELECTED BIBLIOGRAPHY

1965

Review of J. A. Fodor and J. J. Katz, *The structure of language: Readings in the philosophy of language*. *Am. Anthropol.* 67:1011-1020.

On the use of informants in field-work. *Canad. J. Linguist.* 10:108-119.

1971

A note on a Warlpiri tradition of antonymy. In *Semantics*, eds. D. Steinberg and L. A. Jakobovits, pp. 472-482. Cambridge: Cambridge University Press.

1972

A new perspective on American Indian linguistics. With appendix by Albert Alvarez. In *New Perspectives on the Pueblos*, ed. A. Ortiz, pp. 87-133. Albuquerque: University of New Mexico Press.

Some questions about anthropological linguistics: The role of native knowledge. In *Reinventing Anthropology*, ed. D. Hymes, pp. 382-397. New York: Pantheon.

1973

Person marking in Warlpiri. In *A Festschrift for Morris Halle*, eds. S. Anderson and P. Kiparsky, pp. 308-344. New York: Holt, Rinehart, and Winston.

1974

With L. Honie. Ał'ąą Dine'é Bizaad Adhąąh Naha'níígií. *Diné Bizaad Náníl'ííh/ Navajo Language Review* 1:85-94.

1975

Gaps in grammars and cultures. In *Linguistics and Anthropology, in Honor of C. F. Voegelin*, eds. M. D. Kinkade, K. L. Hale, and O. Werner, pp. 295-315. Lisse, Netherlands: Peter de Ridder Press.

1976

The adjoined relative clause in Australia. In *Grammatical Categories in Australian Languages*, ed. R. M. W. Dixon, pp. 78-105. Canberra: Australian Institute of Aboriginal Studies.

1980

Remarks on Japanese phrase structure: Comments on the papers in Japanese syntax. In *Theoretical Issues in Japanese Linguistics*, eds. Y. Otsu and A. Farmer, pp. 185-203. MIT Working Papers in Linguistics, vol. 2. MITWPL, Department of Linguistics and Philosophy, MIT.

With J. White Eagle. A preliminary metrical account of Winnebago accent. *Int. J. Am. Linguist.* 46:117-132.

1983

Warlpiri and the grammar of non-configurational languages. *Nat. Lang. Linguist. Th.* 1:5-47.

With J. McCloskey. The syntax of inflection in Modern Irish. In *Proceedings of ALNE 13/NELS 13*, eds. P. Sells and C. Jones, pp. 173-190. GLSA, University of Massachusetts, Amherst.

Papago (k)c. *Int. J. Am. Linguist.* 49:299-327.

1984

Remarks on creativity in aboriginal verse. In *Problems and Solutions: Occasional Essays in Musicology Presented to Alice M. Moyle*, eds. J. Kassler and J. Stubington, pp. 254-262. Sydney: Hale & Iremonger.

1986

With S. J. Keyser. Some transitivity alternations in English. *Lexicon Project Working Papers 7*. Center for Cognitive Science, MIT, Cambridge, Mass., and *Anuario del Seminario de Filología Vasca "Julio de Urquijo"* ASJU XX-3. pp. 605-638. Donostia-San Sebastian.

1987

With E. Selkirk. Government and tonal phrasing in Papago. In *Phonology Yearbook 4*, eds. C. Ewen and J. Anderson, pp. 151-183. Cambridge: Cambridge University Press.

1989

With L. M. Jeanne. Argument obviation and switch-reference in Hopi. In *General and Amerindian Ethnolinguistics: In Remembrance of Stanley Newman*, eds. M. R. Key and H. M. Hoenigswald, pp. 201-211. Contributions to the Sociology of Language 55. Berlin: Mouton de Gruyter.

1990

With M. Baker. Relativized minimality and pronoun incorporation. *Linguist. Inquiry* 21:289-297.

1991

With A. Barss, E. T. Perkins, and M. Speas. Logical form and barriers in Navajo. In *Logical Structures and Linguistic Structure*, eds. C.-T. J. Huang and R. May, pp. 25-47. Studies in Linguistics and Philosophy 40. Dordrecht: Kluwer.

1992

With S. J. Keyser. The syntactic character of thematic structure. In *Thematic Structure: Its Role in Grammar*, ed. I. M. Roca, pp. 107-144. Berlin: Foris.

1993

With S. J. Keyser. On argument structure and the lexical expression of syntactic relations. In *The View from Building 20: A Festschrift for Sylvain Bromberger*, eds. K. L. Hale and S. J. Keyser, pp. 53-109. Cambridge, Mass.: MIT Press.

1995

An Elementary Warlpiri Dictionary. Alice Springs: IAD Press.

1996

With M. Bittner. The structural determination of case and agreement. *Linguist. Inquiry* 27:1-68.

1997

With D. Nash. Damin and Lardil phonotactics. In *Boundary Rider: Essays in Honour of Geoffrey O'Grady*, eds. D. Tryon and M. Walsh, pp. 247-259. Pacific Linguistics C-136. Canberra: Australian National University.

A Linngithigh vocabulary. In *Boundary Rider: Essays in Honour of Geoffrey O'Grady*, eds. D. Tryon and M. Walsh, pp. 209-246. Pacific Linguistics C-136. Canberra: Australian National University.

Grammatical preface. In *Lardil Dictionary: A Vocabulary of the Language of the Lardil People of Mornington Island, Gulf of Carpentaria, Queensland*, pp. 12-56. Ngakulmungan Kangka Leman/Language Projects Steering Committee, Mornington Shire Council, Gunana, Queensland.

1998

On endangered languages and the importance of linguistic diversity. In *Endangered Languages: Language Loss and Community Response*, eds. L. A. Grenoble and L. J. Whaley, pp. 192-216. Cambridge: Cambridge University Press.

2000

Ulwa (Southern Sumu): The beginnings of a language research project. In *Linguistic Fieldwork*, eds. P. Newman and M. Ratliff, pp. 76-101. Cambridge: Cambridge University Press.

2001

With L. Hinton, eds. *The Green Book of Language Revitalization in Practice*. San Diego: Academic Press.

2002

With S. J. Keyser. *Prolegomenon to a Theory of Argument Structure*. Cambridge, Mass.: MIT Press.