

A Cross-Linguistic Approach to the Causative Alternation

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One of the bedrocks of current linguistic investigation is that there is a fairly direct mapping between thought and language. There is an assumption that at some level of the grammar—whether it is d-structure (Chomsky, 1981), argument structure (Grimshaw, 1990), or lexical conceptual structure (Hale & Keyser, 1986)—there is a tie between language structure and a more universal cognitive perception of events. Perlmutter and Postal's (1984) universal alignment hypothesis (UAH) and Baker's (1988) uniformity of theta assignment hypothesis (UTAH) are concrete expressions of this assumption. These hypotheses, with Chomsky's (1981) projection principle (or its extended variants) impose meaningful constraints on verb argument structures. A universal or uniform association of thematic roles to syntactic positions would eliminate cross-linguistic variation in verb argument structures.

Ideally, children would be able to use such principles in constructing their initial lexical entries for verbs and so avoid confusion from hearing well-formed sentences with null arguments or ill-formed sentences with missing arguments. On hearing a sentence such as 'The stick broke,' the UAH or UTAH would tell a child that the NP 'the stick' was in the direct object position at some level of the syntactic derivation because it bears the thematic role of theme. The linguistic principles in combination with the primary linguistic data would provide the child

with all the information necessary to construct a syntactic derivation for the sentence.

Things are not quite this simple. Some recent work has explored the implications of Perlmutter's (1978) unaccusative hypothesis for the UAH and UTAH. The unaccusative hypothesis claims that it is necessary to distinguish between intransitive verbs such as *run*, *jump*, and *arrive*, which are unergative, and intransitive verbs such as *melt*, *slide*, and *roll*, which are unaccusative. A host of tests in many languages suggest that unergative and unaccusative verbs have different initial argument alignments. If the UAH and UTAH are correct, then all languages should classify the same verbs as unergative or unaccusative. Since Rosen's initial survey (1984), linguists have debated the degree of cross-linguistic uniformity among intransitive verbs (Grimshaw, 1990; Levin & Rappaport Hovav, 1992; Perlmutter, 1989; Van Valin, 1990). Certain subclasses of verbs (e.g., psych verbs and verbs for bodily processes) exhibit more cross-linguistic variation in argument structure than other subclasses (e.g., motion verbs), but a final assessment of the degree of cross-linguistic variation is not available.

Another problem is that languages commonly employ one or more processes that alter the argument structure of verbs. Examples of such processes include the passive, antipassive, causative, dative, locative, conative, middle, and applicative alternations (cf. Baker, 1988). If such processes worked in a uniform manner they would not create a problem because a child would have direct evidence of how each process affected verb argument structure. Passives, for example, eliminate the direct expression of agent roles at the level of syntax, whereas antipassives eliminate the direct expression of theme roles at the syntactic level. The problem is that there is a great deal of cross-linguistic variation in the productivity of each process.

Every language contains verbs that do not undergo a particular process. The verbs *have*, *resemble*, and *want* cannot be passivized in English, for example. Children could solve this problem if the lexical exceptions to a process involved a small set of thematic roles or semantic features (Green, 1974). Pinker's (1989) criterion-based hypothesis applies such a procedure to account for the acquisition of the passive, causative, locative, and dative alternations in English. Such solutions, though, call for cross-linguistic study of argument structure alternations. The lexical exceptions to argument-changing processes should fall within discrete subclasses of verbs across languages. These subclasses, in turn, would provide useful data for determining the relevant restrictions on the operation of the argument-changing processes.

1. THE CAUSATIVE ALTERNATION

In this chapter I show that detailed cross-linguistic data provides an insight into the manner in which the structure of the verb lexicon affects the acquisition of transitivity alternations. I pay particular attention to the causative alternation. Many verbs alternate between intransitive and transitive syntactic forms to indicate the cause of a patient argument's change of state. The mystery is that not all intransitive verbs alternate in the same way. Bowerman (1974) pointed out that children learning English sometimes extend the causative alternation to verbs that alternate in other ways. Thus, Bowerman reported such examples as Christy (2;9) saying 'I come it closer so it won't fall' instead of 'I made it come closer' or 'I moved it closer.' My own son has produced several of these errors, including 'Mommy has to talk the king' for 'Mommy has to make the king talk' (at age 3;7).

Pinker (1989) underlined the dilemma such constructions raise for language acquisition theories. Once children determine that a particular transitivity alternation is productive they may extend the alternation to new verbs. Such extensions are unacceptable for English verbs like *come*, but there is no record of parent tutorials correcting children who produce these forms. There is no other obvious means that children could rely on to cut back unacceptable extensions. Thus, there is no logical procedure children can use to acquire the causative alternation.

Pinker outlined three possible sources of children's errors. They could be applying a lexical rule too broadly, and fail to notice narrow-based semantic constraints that restrict the lexical rule. Alternatively, children may retrieve the wrong verb stem under pressure from the discourse. A third possibility is that children have not yet acquired an adult semantic representation for some verbs and thus misuse these verbs. Pinker felt that children stop producing causative errors when they learn the meaning of each verb, when they are better at retrieving verbs, and when they learn the proper restrictions on the causative alternation.

This chapter reports the results of a pilot elicitation study that I conducted with K'iche' Maya children from the Western Highland region of Guatemala. The K'iche' children showed a different pattern of causative alternations than their English-speaking peers, which indicates that language-specific structures influence the acquisition of the causative alternation more than the semantic structure of individual verbs. The following section sets out the system of causative alternations found in the K'iche' language. The next section presents acquisition data on the K'iche' causative from a longitudinal study of children. I then present the results

of an elicitation study on the causative alternation and discuss its findings. In the last section I discuss the implications of this study for different theoretical proposals concerning the acquisition of the causative alternation.

2. THE CAUSATIVE ALTERNATION IN K'ICHE' MAYA

K'iche' is a Mayan language spoken by a million inhabitants of the Western Highlands of Guatemala. K'iche' has an agglutinating morphology that reflects the distinction between transitive and intransitive verbs in several respects (see example 1). The language has an ergative cross-referencing system on the verb, so intransitive verb subjects and transitive verb objects are marked with an absolutive marker whereas transitive verb subjects receive a distinctive ergative marker. All verbs also require a special clause-final termination, which distinguishes between transitive and intransitive verb stems (Pye, 1983a).¹ Intransitive verbs in simple, declarative sentences have the clause-final termination /-ik/, "root" transitive verbs in the same sentences have the termination /-oh/ or /-uh/ and "derived" transitive verbs have the termination /-Vj/ where V may be either /i, e, a, o, u/.

(1) Transitive verbs	Intransitive verbs
a. k-at-inw-il-oh INCOMP-2A-1E-see-TTV 'I see you.'	c. k-at-b'e:-ik INCOMP-2A-go-IV 'You are going.'
b. k-Ø-a-kuwi:-j INCOMP-3A-2E-hurry-TV 'You are hurrying.'	d. k-Ø-taq'en-ik INCOMP-3A-PROGRESSIVE-IV 'It is-ing.' ²

¹All K'iche' words are shown in the practical orthography developed by the Proyecto Lingüístico Francisco Marroquín (Kaufman, 1976) with a single exception: I use <'> rather than <7> for the glottal stop. The other orthographic symbols have their standard IPA values except: <tz> = /ts/, <ch> = /tʃ/, <b'> = /b/, <tz'> = /tʂ/, <ch'> = /tʃʰ/, <x> = /x/, <j> = /j/. I use the colon <: > to indicate long vowels.

I have also used the following morphological abbreviations: COMP = completive aspect; INCOMP = incompletive aspect; 1A, 2A, 3A = first-, second-, third-person singular absolutive person markers (what Mayanists refer to as "set B"); 1E, 2E, 3E = first-, second-, third-person singular ergative person markers (or "set A"); CAUSE = the causative morpheme; ABS = the absolutive antipassive; TV = the affix marking derived transitive verbs; TTV = the clause-final termination marker for root transitive verbs; IV = the clause-final termination marker for intransitive verbs.

²This verb serves as an overt marker of the progressive aspect in K'iche'. K'iche' speakers frequently shorten the verb to *taq'en* or even *q'en*.

K'iche' uses the suffix /-isa/ to derive the causative form of intransitive verbs. Examples of this causative construction are shown in (2). In K'iche' the causative suffix can only be added to intransitive verb stems, unlike Berber, Japanese, and Korean where it is also possible to add a causative affix to transitive verb stems.

(2) K'iche' causative verbs with /-isa/	
Intransitive Form	Causative Form
a. k-Ø-poqow-ik INCOMP-3A-boil-IV 'It is boiling.'	k-Ø-a-poqow-isa:-j INCOMP-3A-2E-boil-CAUSE-TV 'You are boiling it.' (= cause to boil)
b. q'alaj clear 'It is clear.'	k-Ø-in-q'alaj-isa:-j INCOMP-3A-1E-clear-CAUSE-TV 'I will clarify things.' (= cause to be clear)

Although the causative construction is very productive in K'iche' it is not completely so. There are two classes of intransitive verbs in K'iche' that do not take the causative affix. The first of these exceptional classes uses another means of deriving a transitive verb stem. I refer to this class of verbs collectively as the "zero class," although the examples in (3) show that this set of verbs uses several different derivational processes. The transitive verb in (3a) has a polysyllabic stem and so takes a "derived" transitive termination marker /-j/.³ Its intransitive counterpart deletes the final vowel from the stem and changes the final consonant before adding the intransitive termination. The verb pair in (3b) simply switch termination markers without changing any other part of the verb stem, while the intransitive verb in (3c) adds the intransitive termination to the whole transitive verb, including its derived transitive termination as part of the intransitive stem. I group these verbs together because they share the feature of alternating between intransitive and transitive verb forms by a derivational process that is distinct from the regular affixal causative process (c.f. Dayley, 1985).

³Mayan linguists analyze the transitive verb form as containing the causative suffix in an underlying level of the derivation. Because Mayan verb roots are monosyllabic, all derivational processes that yield transitive verb stems produce polysyllabic stems. In this case the underlying form of the transitive verb would be *qa-isa-j*. The initial vowel of the causative affix /i/ is lost through a regular process of vowel merger and the final consonant /j/ of the intransitive stem would be added by epenthesis. I have included the verb in the zero derivation category because the processes of vowel merger and epenthesis obscure the relation between the intransitive verb form and the output of the affixal causative derivation. I also do not want to assume that this relation is apparent to children learning K'iche'.

(3) K'iche' zero class verbs

Transitive verbs	Intransitive verbs
a. k- \emptyset -in-qasa:-j INCOMP-3A-1E-go__down-TV 'I am taking it down.'	k-in-qaj-ik INCOMP-1A-go__down-IV 'I am going down.'
b. x- \emptyset -in-tzaq-oh COMP-3A-1E-drop-TTV 'I dropped/lost it.'	x-in-tzaq-ik COMP-1A-fall-IV 'I fell.'
c. x- \emptyset -a-tzali:-j COMP-3A-2E-return-TV 'You returned it.'	x-at-tzali-ik COMP-2A-return-IV 'You returned.'

I dub the remaining set of exceptional intransitive verbs the periphrastic class. This set of verbs does not permit any derivational process to produce a simple transitive verb stem. The only way to express a transitive notion with the members of this set is to use a complex sentence that contains a verb like *-b'an* 'do/make'. Examples of periphrastic verbs are shown in (4).

(4) K'iche' periphrastic verbs

Intransitive verbs	Periphrastic constructions	
a. k-in-pet-ik INCOMP-1A-come-IV 'I am coming.'	k- \emptyset -in-b'an INCOMP-3A-1E-do	k-at-pet-ik INCOMP-2A-come-IV 'I will make you come.'
b. k-in-muxan-ik INCOMP-1A-swim-IV 'I am swimming.'	k- \emptyset -in-b'an INCOMP-3A-1E-do	k-at-muxan-ik INCOMP-2A-swim-IV 'I will make you swim.'

The K'iche' causative alternation is further complicated by one additional factor. Transitive verbs may lose the direct object with the addition of an absolutive antipassive affix. K'iche' speakers use the absolutive antipassive to emphasize an action rather than a result (Mondloch, 1981). With many verbs, the antipassive acts like an anticausative. Two examples of the absolutive antipassive alternation are shown in (5).

(5) The K'iche' absolutive antipassive

a. k- \emptyset -u-chaku:-j INCOMP-3A-3E-work-TV 'He/she is working it.'	k- \emptyset -chaku-n-ik INCOMP-3A-work-ABS-IV 'He/she is working.'
b. x-in-a-tze'-j COMP-1A-2E-laugh-TV 'You made me laugh.' ⁴	x-at-tze'-n-ik COMP-2A-laugh-ABS-IV 'You laughed.'

⁴The translation of such verbs presents immense difficulties for linguistic theories that seek a uniform mapping relation between semantic and syntactic components. The K'iche'

To put it mildly, the combination of productive causative and antipassive alternations plus a good number of lexical exceptions should create considerable problems for any child so unfortunate as to be faced with the prospect of learning K'iche'.⁵ Such complexity provides the perfect testing ground for competing hypotheses about the sources of children's derivational rules. If children are conservative learners, they should be unwilling to produce a causative alternation until they have learned the proper lexical form. In this case their language productions should be error free (Baker, 1979). Another possibility would be that children adopt a simple lexical schema as a ready-made means of producing the causative alternation (Braine, Brody, Fisch, & Weisberger, 1990). Such a schema would result in a multitude of overgeneralization errors for K'iche', such as using simple intransitive verb stems in transitive sentences. Finally, children might rely on some type of semantic classification when applying the causative alternation (Green, 1974; Pinker, 1989; Slobin, 1985). In this case K'iche' children should initially behave like children learning English and have difficulty with similar ranges of semantic subclasses of verbs.

3. ANALYSIS OF K'ICHE' LANGUAGE SAMPLES

Spontaneous language samples suggest that the causative derivation is a relatively late acquisition for K'iche' children. I have found that by age 2;10 the children are beginning to produce examples of causativized verbs (Pye, 1992). Children learning English begin to produce examples of causativized verbs around 2;2, whereas children learning Turkish apparently begin producing causativized verbs around 2;3 (Aksu-Koç & Slobin, 1985). The K'iche' children's causativized verbs alternate with the intransitive verb forms, sometimes in the same session. Their alternations are evidence that the children apply a productive morphological alternation rather than using the same verb form in transitive and intransitive contexts. However, the children do not use the causative affix very frequently in the spontaneous data. My three primary subjects produced a total of 24 affixal causativized verb tokens in 20,103 utterances. The children also used intransitive and transitive verbs from both the zero and periphras-

verb *tze'* might also be translated as 'amuse', but the choice between 'laugh' or 'amuse' would have to be made on a semantic basis. To use verb transitivity as a basis for translation would lead to a circular argument that verb meaning determines verb argument structure and verb argument structure determines the translation of verb meaning (Pye, 1993b).

⁵I do not examine antipassive forms of causativized verbs or the causative forms of antipassive verbs here. Both occur sporadically in K'iche'.

tic verb classes without adding the causative affix to them. They did not add the causative affix to any transitive verb stems.

I have found two examples in which one of the children failed to produce the causative affix. The first occurred when Al Cha:y was 2 years and 10 months old and had a mean utterance length of 1.92 morphemes. Her older sister told her to tell me to turn on my tape recorder using a verb that requires the causative affix in this context. Al Cha:y produced this utterance as *k'at e laya* (= *chak'atisaj le: aradio*). Al Cha:y's production lacks the causative affix and literally means 'Your radio is burning.' The causativized form of this verb undergoes a semantic shift from 'burn' to 'turn on.' Two weeks later my assistant and I were picking the girls up and swinging them around. We had just done this with Al Cha:y's sisters and Al Cha:y wanted to be next. In this context she produced the utterance *lij in* (= *kinawalijisaj in*). If she wanted to be picked up she should have used the verb with the causative affix (*walij-isa-j*). Her utterance literally means 'I am going up,' which is a possible, though less likely, interpretation in this context. Later in the same tape Al Cha:y succeeded in producing a verb with the causative affix (*paw'ixaj chik* = *kinapaqilisaj chik* 'Pick me up again').

This result agrees to some extent with acquisition data from other languages. Bowerman (1974) provided many examples of such causative overgeneralizations in English, and Berman (1982) noted examples from the initial stage of learning Hebrew. The number of examples these authors cited lead one to believe that causative overgeneralizations are fairly common in the initial stage of language acquisition. Unfortunately it is impossible to calculate base rates of overgeneralization on the basis of the data provided. My finding of 2 overgeneralizations in 20,103 utterances is comparable to Maratsos' (1979) estimation that Bowerman's 100 or so examples were culled from approximately 750,000 utterances. However, it would be more accurate to use the number of transitive contexts in which affixal causative verbs appear rather than the total number of utterances to calculate overgeneralization rates. For the K'iche' samples, the finding of 2 overgeneralizations in 26 contexts increases the rate of overgeneralization to 8%. This rate suggests that K'iche' children have an accurate knowledge of verb transitivity that is susceptible to occasional lapses in performance (cf. Pye, 1987). The verb argument structures in their verbal lexicon are essentially correct.

4. AN EXPERIMENTAL STUDY

Experimental studies provide the best means of estimating overgeneralization rates and thereby children's knowledge of the causative alternation. Such studies provide a convenient way to collect information on

a large number of causative verb forms in a short amount of time. An experimental study of the K'iche' causative alternation provides the best way of collecting information on children's knowledge of all three verb categories as well as a way to determine whether children make the same types of overgeneralizations with the verbs in each category. One drawback to such a study might be that it would induce children to make more than the usual number of overgeneralizations. A control for this problem is to test older subjects. If the experiment induces adult subjects to overgeneralize then it is not looking at lexical competence. If there is a gap between the children's rate of overgeneralization and that of the adults, then one can estimate the degree of priming the experiment is creating and eliminate that from the estimation of the children's overgeneralization rates. I put together a pilot test of the K'iche' causative alternation using verbs from all three groups. The verbs are shown in (6).

(6) K'iche' verbs from causative elicitation study

Morphological	Zero-derivation verbs	Periphrastic verbs
xojow-isa dance-CAUSE	qaj-ik go_down-IV	muxan-ik swim-IV
aq'an-isa climb-CAUSE	sutin-ik turn-IV	wakat-ik walk-IV
ch'aqt-isa wet-CAUSE	el-ik leave-IV	pet-ik come-IV
noj-isa full-CAUSE	wul-ik destroy-IV	
atin-isa bathe-CAUSE		

5. METHOD

Our initial pilot testing had shown that we could induce children to produce more causative forms if we began with some familiar causativized verbs. Therefore, we began the test by eliciting the causative forms for the verbs *xojow* 'dance' and *aq'an* 'climb'. Thereafter we alternated between the different classes of verbs. We used the same order for each child (*xojow* 'dance', *aq'an* 'climb', *ch'aqt* 'wet', *qaj* 'go down', *sutij* 'turn', *wul* 'destroy', *pet* 'come', *noj* 'full', *atin* 'bathe', *el* 'leave', *muxan* 'swim', and *wakat* 'walk'). We used a set of plastic farm animals as our stimulus items, primarily a mother pig and two baby pigs. For example, our protocol for the verb *xojow* 'dance' went:

'Kaxojow ri: aq i'. Kawiloh? Kaxojowik. Ma kaxojow taj le: jun aq chik. Kara:j na luna:n kaxojow le: ra:l y ku'an le: ri ri'. Jas ku'an le: nan che le: ra:l?'

'This baby pig is dancing. See? It's dancing. The other baby pig is not dancing. Its mother wants her baby to dance so she goes like this. What is she doing to her baby?'

If a child failed to respond, we would repeat the action and again ask what the mother was doing to her baby. If a child responded that the baby was dancing, we would draw the child's attention to the mother's action and again ask what the mother was doing to her baby. If the child still could not say what the mother was doing, we would record the response as a refusal and go on to the next item. I was surprised to find that we had very little difficulty eliciting transitive verbs from even our youngest subjects in this manner. While one of us manipulated the animals and delivered the monologue, the other would transcribe the children's responses. In addition, all sessions were audio-recorded.

6. RESULTS

Table 8.1 shows what an ideal response pattern would look like. Children should use the morphological form of the causative with morphological causative verbs, the zero form with zero derivational verbs, and the periphrastic form with periphrastic verbs. Anything else would count as an overgeneralization.

We elicited quite a range of responses from our subjects. Besides the expected (adult) responses, the children used other transitive verbs, other causativized verbs, periphrastic responses, the intransitive verb form, or another intransitive verb. Their responses are shown in Table 8.2. I calculated the percentage of overgeneralizations based on the types of errors for each class of verbs. For the morphological causative, only the use of a zero form would count as an overgeneralization. For the zero verb class, only the use of a causative affix /-isa/ would count as an overgeneralization, and for the periphrastic verbs, the use of either the causative affix or a zero derivation would count as an overgeneralization.

7. DISCUSSION

Our most significant finding is that we actually succeeded in eliciting some causative overgeneralizations from the children. We have had some difficulty eliciting passive sentences from K'iche' children in previous

TABLE 8.1
Ideal Response Pattern

Type	Type Used		
	Morphological	Zero	Periphrastic
Morphological	X		
Zero		X	
Periphrastic			X

TABLE 8.2
Causative Data

	4,5,6,7 years (N = 11)			8,9,10,11 years (N = 62)			12,13 years (N = 7)		
	Morph	Zero	Other	Morph	Zero	Other	Morph	Zero	Other
Morphological									
xojowisa:j	11			58		4	7		
atinisa:j	11			55		7	6		1
aq'anisa:j	11			42		20	4		3
nojisa:j	8		3	36		26	6		1
ch'aqtisa:j	1		10	32		30	3		4
Percent	0	(0/42)		0	(0/223)		0	(0/26)	
Zero									
qasa:j	3	4	4	12	31	19	1	4	2
suti:j		11		4	55	3	1	6	
esa:j		8	3		46	16		2	5
wuli:j		3	8		16	35		1	6
Percent	10	(3/29)		10	(16/164)		13	(2/15)	
Periphrastic									
muxanik	1	7	3	1	28	33	1	1	5
wakatik	1		10	3	1	58		1	6
petik			3			23			5
Percent	35	(9/25)		24	(33/139)		16	(3/19)	
Total Percent	10	(11/107)		8	(49/575)		8	(5/63)	

studies (Pye & Quixtan Poz, 1988), so I was relieved to find that it was fairly easy to get the children to talk about causative actions. Some children added the causative affix to the zero class verbs *qajik* 'go down' and *sutinik* 'turn', as well as the periphrastic class verbs *muxanik* 'swim' and *wakatik* 'walk'. It was also a surprise to see that the children applied the zero derivation to verbs in the periphrastic class as well as using the regular causative derivation. For *muxanik* 'swim' their favorite zero derivation was *muxa:j*, whereas their zero derivation for *wakatik* 'walk' was *wakati:j*.

I was not prepared to find the children overgeneralizing these verbs so frequently. I had expected the children to overgeneralize in 8% to 10% of their responses based on my previous estimation from longitudinal samples and reports in the literature (Cazden, 1968). Experimental studies such as this one seem to elicit higher rates of overgeneralization. Maratsos et al. (1987) reported a mean overgeneralization rate of 26%, and a recent study by Braine et al. (1990) found their subjects overgeneralized the English causative alternation to intransitive verbs in 39% of

the trials. Seventy-three percent (8/11) of the youngest K'iche' subjects extended the causative to the verb *muxanik* 'swim', and 43% (3/7) extended the morphological causative to the verb *qajik* 'go down'. Only 33% (2/6) of the oldest subjects extended the causative to the verb *muxanik* 'swim'.

There is no indication of an order effect in the children's responses. The final verbs on the test *muxanik* 'swim' and *wakatik* 'walk' had a large number of overgeneralizations, but the verb that immediately preceded them (*elik* 'leave') was not overgeneralized by any of the children. The children produced overgeneralized forms of two of the verbs in the zero class (*qajik* 'go down' and *sutinik* 'turn'), which were the fourth and fifth items on the test. However, none of the children overgeneralized the sixth and seventh items on the test (the verbs *wulik* 'destroy' and *petik* 'come'). These trends suggest that the children's responses reflected the state of their knowledge of the individual lexical items rather than a simple priming effect from the order of elicitation.

I was especially surprised that we succeeded in eliciting causative overgeneralizations from 13-year-olds. An assumption has crept into the literature that all the interesting developments in syntax occur before 5;0. Pinker (1989, p. 289) stated that Christy made such overgeneralizations over a period of 6 years, from 2;1 to 7;11. Braine et al. only tested 2- and 4-year-olds in addition to adults. The K'iche' data shows that the acquisition of lexical alternations is not completed in all languages by 8;0. This, of course, raises the learnability issue of exactly what mechanism would operate over such an extended period of time. The slow rate of progress rules out a maturational or grammatical change because such changes would lead to more abrupt "across-the-board" restrictions on the causative.

There was a striking difference in the children's willingness to produce transitive versions of individual verbs. The children were quite happy to supply causativized versions of the verbs *xojow* 'dance', *aq'an* 'climb', and *atin* 'bathe', but had real trouble finding a way to causativize *ch'aq* 'wet' and to a lesser extent *noj* 'full'. This result shows that our experiment was not equally successful in eliciting the causative forms of all the verbs. Subjects often responded to probes on *ch'aq* 'wet' with the causative form of *atin* 'bathe' because bathing someone is more typical than wetting them.

Even more striking was the difference in the children's overgeneralizations of the verbs in each class. Three of the youngest subjects overgeneralized the verb *qajik* 'go down' and eight children overgeneralized the verb *muxanik* 'swim'. None of them overgeneralized the verbs *sutinik* 'turn', *elik* 'leave', and *petik* 'come'. In fact we stopped using the verb *petik* 'come' in our experiment because the K'iche' children were

unwilling to causativize it and it seemed to lead to more frustration on their part when we kept probing for it.

This data suggests another important difference between children learning K'iche' and those learning English. Pinker (1989, p. 303) reanalyzed Bowerman's (1982) data and found that children learning English most frequently causativized the verbs *come*, *go*, *fall*, *rise*, and *drop*. The K'iche' children did their best to avoid causativizing the verb *petik* 'come' while most frequently overextending the causative derivation to the verbs *qasaj* 'go down', *muxanik* 'swim', *sutinik* 'turn', and *wakatik* 'stroll'. Berman (1982) reported that Hebrew-speaking children overgeneralize the intransitive forms of the verbs *see*, *eat*, *move*, *sit*, *hurt*, *go down*, *get up* (p. 179) and Aksu-Koç and Slobin reported errors with the Turkish verbs *burn* and *get up* (1985, p. 849). The data suggests significant cross-linguistic differences in the verbs children overgeneralize.

One possible explanation for these cross-linguistic differences would be a difference in input frequencies. If frequencies of the verbs differed significantly in the input languages, they might underlie differences in the children's knowledge of each verb and therefore differences in the overgeneralization rates for each verb. Children should find more evidence for a verb's argument structure if that verb is frequently produced by parents. Children might produce more causative overgeneralizations with verbs that are less frequent in the input.

I examined this issue by counting the different verbs in the speech of the mothers in my spontaneous samples of K'iche'. I had previously selected samples in which the mothers did a lot of the talking to estimate the frequency with which the mothers used various morphemes. I counted the number of times the mothers used each of the verbs from the causative experiment. For a comparison with English I counted the number of times Adam's mother and Eve's mother used the English equivalents of the K'iche' verbs in their first samples (Brown, 1973).⁶ I used the Pye Analysis of Language (PAL) computer program to extract the verbs from the mothers' language samples (Pye, 1987). The results are shown in Table 8.3.

I included tokens of both transitive and intransitive uses of the verbs in my count. Thus, I counted uses of both *pet* 'come' and *k'am* 'bring' for the K'iche' mothers and their equivalents for Adam's and Eve's mothers. I also excluded uses of the English verbs that fell outside the range of meaning of the K'iche' verbs. Adam's and Eve's mothers tended to use the verb *leave* more frequently with a meaning of 'let it stay' rather than 'go out of some place'. I only included the latter use in my count.

⁶I used the first sample of Adam's speech (Adam01.chi) from the Chiles database for this estimate (Brown, 1973).

TABLE 8.3
Token Frequency of Experimental Verbs in Speech to Children

Verbs	K'iche' Mothers			English Mothers	
	Al Tiya:n	Al Cha:y	A Carlos	Adam	Eve
xojow 'dance'					3
aq'an 'climb'				2	1
ch'aq 'wet'		2			
qaj 'go down'	1				
sutij 'turn'		2			6
wulin 'destroy'					
pet 'come'	23	32	5	3	16
noj 'fill'					
atin 'wash'	1			1	
el 'leave'	3	5	2	2	4
muxan 'swim'					1
wakat 'walk'				3	
Total verb types	58	88	36	82	74
Total verb tokens	285	417	290	523	789

These samples may not be large enough to provide incontrovertible evidence of a difference in input frequency between K'iche' and English, but they are robust enough to rule out a simple correlation between input frequency and causative overgeneralizations.

There is a fair degree of consistency between the K'iche' mothers, which derives from their frequent use of the verbs *pet* 'come' and *el* 'leave' and their transitive counterparts *k'am* 'bring' and *esa:j* 'take out'. It is also true that the K'iche' subjects in my experiment did not overgeneralize the causative with these verbs. However, the K'iche' children did not overgeneralize the causative with the verb *wulin* 'destroy' either, despite its infrequency in the input. Adam's and Eve's mothers both used the verb *come* the most frequently. This finding is at odds with English-speaking children's frequent overgeneralization of the causative alternation with *come*. It seems as though differences in input frequencies will not account for the cross-linguistic differences in children's willingness to overgeneralize the causative with certain verbs, although this issue should be pursued further with larger samples of parental speech to children.

Interestingly, the children did not overgeneralize the intransitive verb forms to transitive contexts. The classic observation from Bowerman is that children use intransitive forms in transitive contexts—for example, Christy (2;9) said 'I'm gonna just fall this on her.' In fact, this is the phenomenon that Braine and Maratsos succeeded in eliciting from their subjects. Berman (1982, p. 179) reported that this is a relatively frequent error for Hebrew-speaking children and Aksu-Koç and Slobin (1985, p. 849) provided an example of this type of error in Turkish. Even though

I found two examples of such an error in my spontaneous K'iche' data, we did not elicit a single example of this sort from our K'iche' subjects. We did elicit a few intransitive verbs from the children, but in these cases it is clear that the children were using the verbs as intransitives. The verbs have an intransitive morphology, and more telling, the children only used these verbs with one argument.

One 7-year-old boy, for example, produced the sentence in (7a). His sentence only contains one argument ('the little pig') and the verb uses the regular third-person absolutive subject marker and the intransitive verb termination */-ik/*. For the trial with *pet* 'come' this same boy produced the sentence in (7b). In this example the boy retains a transitive relation by using the transitive verb *yo* 'scold', and manages to convey the right motion by adding an extra clause with the intransitive verb *pet* 'come'. He displays his control of the verb morphology in switching between an ergative subject marker on the transitive verb *yo* 'scold' and an absolutive subject marker on the verb *pet* 'come'. The verbs also have the correct termination markers. I think the discrepancy in the types of causative overgeneralizations produced in my spontaneous and experimental studies might stem from the ages of the subjects in the two studies. I plan to work with younger subjects in a future experiment on the causative to see if they will use intransitive verb forms in transitive sentence contexts.

- (7) a. kamuxanik le: wich' aq
 k-Ø-muxan-ik
 INCOMP-3A-swim-IV the little pig
 'the little pig is swimming.'
- b. kuyo'oj b'ik eh kapetik
 k-Ø-u-yo'-oj b'i-k eh k-Ø-pet-ik
 INCOMP-3A-3E-scold-TV there-T and INCOMP-3A-come-IV
 'She scolds him and he comes.'

8. THEORETICAL IMPLICATIONS

I think this data, admittedly preliminary, supports a number of conclusions about the process of acquiring the causative alternation. Both the spontaneous and experimental data confirm observations from English that children will overgeneralize the causative alternation in ways that violate adult usage. This finding disconfirms Baker's (1979) hypothesis of conservative learning. Unfortunately, this finding also raises the learnability paradox discussed so extensively in Pinker (1989). What mechanism can children rely on to learn the adult restrictions on lexical alternations like the causative?

Braine et al. (1990) proposed a competition between the verbs' argument structure and canonical sentence schemas to account for children's causative overgeneralizations. This is essentially identical to Pinker's hypothesis that children first construct a broad-based rule as the basis of the causative alternation. It is important to recognize that the alternation takes place in both directions, as Braine et al. demonstrated (see also Aksu-Koç & Slobin, 1985, p. 848; Berman, 1982, p. 180; Lord, 1979). Children could apply such a rule without changing the lexical entries of verbs. However, some additional mechanism is needed to explain why adults do not use canonical sentence schemas as often as children. The fact that the K'iche' children in the experimental study never used an intransitive verb in a transitive argument frame suggests that they have extracted more than a simple alternation between argument structures. They have mastered the morphological changes associated with the changes in verb transitivity in K'iche' (cf. Pye, 1985).

Pinker (1989) proposed that children come to rely on narrow range semantic verb classes to acquire the adult restrictions on lexical alternations like the causative. Pinker derived the narrow semantic verb classes on the basis of his Grammatically Relevant Subsystem Hypothesis (1989). He stated that

for it to be true, there would have to be a single set of elements that is at once conceptually interpretable, much smaller than the set of possible verbs, used across all languages, used by children to formulate and generalize verb meanings, used in specifically grammatical ways . . . , and used to differentiate the narrow classes that are subject to different sets of lexical rules. (p. 169)

He failed to show that the set of elements he used to characterize the causative alternation in English has cross-linguistic validity or guides children in restricting the causative alternation to specific narrow verb classes.

The form of Pinker's hypothesis creates a dilemma. If the set of semantically relevant elements is too small, the degree of cross-linguistic variability is overly restricted. It follows that all languages would differentiate pretty much the same narrow verb classes. If the set of elements is too large, it will allow for more cross-linguistic variation, but at the cost of becoming nothing more than an extremely complex feature notation. Unfortunately, it is difficult to tell how Pinker intended to use his semantically relevant elements because many of his semantic representations contradict his definitions of the semantic elements. He represented the verb *support* as a STATE incorporating an ACT (p. 201). Earlier he stated that ACTs have the feature < + dynamic > and STATES are < - dynamic > (p. 195). Feature clashes of this sort usually lead to ill-formed structures.

Another example of his flexibility in applying the basic semantic elements occurs in his discussion of the cross-linguistic differences that exist with respect to the unergative/unaccusative distinction. By and large, unaccusative verbs causativize whereas unergative verbs do not. There is considerable cross-linguistic variation in the unaccusative distinction, however (Rosen, 1984). Pinker solved this problem by hypothesizing that in some languages ambiguous verbs "may be expressed as a kind of ACT, in others as a kind of GO or BE" (p. 225). Such flexibility indicates that Pinker's elements do not have an independent conceptual interpretation; they can be attached to any verb as a diacritic of its ability to causativize. This imprecision makes it impossible to empirically test Pinker's theory in its current form.

Apart from these definitional problems, Pinker's theory cannot account for the findings from the experimental study. His theory does not predict cross-linguistic differences in which verbs children will be prone to overgeneralize. All children learning a particular verb should have the same difficulty in learning the semantic elements associated with the verb's meaning. Pinker's narrow range semantic constraints hypothesis cannot explain why K'iche' children show such reluctance to causativize the verb *petik* 'come', whereas English-speaking children causativize the verb *come* with relative abandon. The meaning of these verbs is as similar as verb meanings can be in different languages, thus some factor beyond verb meaning must affect children's tendency to causativize verbs.

Another difficulty with Pinker's theory is that it is not compatible with the extended period of time children require to develop causative restrictions. Thirteen-year-olds should have a fairly accurate representation of the meaning of *muxanik* 'swim' and *sutinik* 'turn' as well as a basic understanding of which narrow range semantic classes these verbs belong to. Although Pinker is not specific about the length of time children need to establish the narrow range restrictions on lexical rules, such a process should not require the better part of a decade. The semantic elements that are basic to Pinker's acquisition mechanism should be readily accessible to children because they constitute a small set of universally relevant semantic features.

The preceding arguments suggest that lexical retrieval processes may be the primary determinant of children's causative errors. I think it is best to view the problem in the general perspective of choosing a suitable verb on any given occasion. Children are learning the difference between the verbs *come* and *go*, *bring* and *take*. The causative alternation requires that they also appreciate the difference between the verbs *come* and *bring* as well as *qajik* and *qasa:j*. Several studies have suggested that children do not always succeed in retrieving the proper word (Hoek, Ingram, & Gibson, 1986). The retrieval process is especially indicated in

children's failure to select a suppletive alternate. They may lack this alternate or not be able to retrieve it as readily as the other form. The availability of suppletive forms provides children with positive evidence for the appropriateness of the different verbs. Thus acquiring lexical alternations is no different from acquiring irregular inflections. Pinker stated that such suppletive alternations account for 77% of Bowerman's data.

Another finding in favor of the retrieval process is that it explains why children only produce causative errors intermittently. If children actually did have an immature semantic representation of a verb's meaning, they would use the verb incorrectly every time they met a suitable occasion. Instead, children only produce causative overgeneralizations in extraordinary circumstances (such as elicitation experiments), and then only in a certain percentage of instances. The retrieval explanation would account for the individual differences between children in the verbs they overgeneralize as well as the frequency with which they overgeneralize them. Each child's history of encounters with verbs would lead to individual developmental profiles. The retrieval process would also become better with time as children added suppletive forms to their lexicon and strengthened their access to individual verbs. This would be compatible with the extended developmental time frame seen in the data.

I have mentioned before that another factor seems to be affecting the children's access to particular verbs. The best example of this is the difference between the K'iche' and English-speaking children's willingness to causativize the verb for *come* in their languages. K'iche' children would be able to use the monosyllabic form of the verb stem as additional information about the verb and its possibilities for participating in a transitivity alternation. There is a basic split in the K'iche' language between monosyllabic and polysyllabic verb stems. Monosyllabic stems are underived transitive or intransitive stems. They only alternate with the addition of an affix. Most polysyllabic verb stems are derived from some other type of root. They are more likely to alternate in transitivity with a simple affix change. The K'iche' children could use the monosyllabic status of the verb *pet* to infer that it was an underived intransitive verb and only alternate it when they encountered positive evidence in their input.

The K'iche' children show further evidence of this sensitivity to the derived/underived verb distinction in their willingness to overgeneralize the causative alternation to the verbs *muxanik* 'swim' and *wakatik* 'stroll'. Their tendency to overgeneralize the verb *muxanik* is especially pronounced and may stem from the misinterpretation of the /n/ in the stem as an absolutive antipassive affix. Verbs with the antipassive have a straightforward transitive form, and if *muxanik* was an antipassive form, its transitive equivalent would be *muxa.j*. This is indeed the form supplied most frequently by the K'iche' children, and thus striking evidence

that the children have extracted the underlying distinction between derived and underived verb stems.

I think there is support for this position in the results Berman (1992) reported on verb-pattern alternation in Hebrew. Recall that Hebrew children use intransitive verb forms in transitive contexts in the same way English-speaking children do. They also make the reverse error, as Lord (1979) reported for English. Hebrew employs a complex system of stem changes to encode the causative alternation. Verb stems generally fall into a set of five patterns that constitute the Binyan system of alternations. Most of the verbs in pattern one (e.g., *katav* 'write') have a causative form in pattern five (e.g., *bixtiv* 'dictate'). Some pattern one verbs (e.g., *lamad* 'learn') have causative forms in pattern three (e.g., *lamed* 'teach'). Reflexive verbs (e.g., *mitracex* 'wash') in pattern four have a transitive form in pattern one (e.g., *roxec*) and inchoative verbs retain their pattern five form in causative contexts (e.g., *yavri* 'become healthy'). A few process verbs also have the same pattern five form in intransitive and causative contexts (e.g., *bitxil* 'start').

This is a complex system and, not surprisingly, it takes many years before children learn it completely. I think the interesting feature of the Hebrew Binyan system is the extent to which the first pattern contains many transitive and intransitive verbs. Berman stated that pattern one is used for the transitive actions *make = do, give, eat, drink, build*, for stative verbs such as *like, want, see*, and for intransitives like *go, sleep, run, jump, and sit*. Thus, unlike the situation in K'iche' where there is a clear morphological distinction between transitive and intransitive verbs, children learning Hebrew have plenty of evidence that pattern one contains both transitive and intransitive verbs. I think this is the primary reason why they use the verbs in different contexts without making the necessary morphological changes.

My last conclusion would be that children may never entirely succeed in accessing the correct verbs all of the time. I have received written responses in my university classes from undergraduates who have overgeneralized verbs. One such example is "These changes don't deteriorate the language." Even the 1991 Stanford child language conference abstracts contains the example, "When encountered with sentences. . . ." Thus the retrieval process becomes essentially error free in adults for core verbs, but remains susceptible to intrusions in the case of low frequency verbs.

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