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Acquiring Lexical Constraints on Causatives in K'iche' Maya

Verbs are definitely where the action is. They 'project' the basic argument structure of the simple clause and define significant binding and bounding domains. For these reasons, the primary task of acquisition theory must be an explanation of how children establish the semantic and syntactic features of verbs. Naturally it would be easy to explain children's accomplishments in this domain if verbs just came in one flavor, say transitive. Children could then assume that every verb projected two arguments and search the linguistic input for indications of how these arguments surface in adult sentences.

To my mind, however, one of the most appealing characteristics of our field is that life is not that simple. A plethora of bewildering verb types await young language learners, who must sort out this confusion on the basis of infrequent and inconsistent information on each verb. Melissa Bowerman has discussed many of these problems in previous CLRFs and Pinker's 1989 book, *Language and Cognition*, is essential reading for anyone interested in the logical problem of language acquisition.

I only have time to look into a small corner of this problem in this paper - the acquisition of 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 pointed out that children learning English sometimes extend the causative alternation to verbs that alternate in other ways. Thus, Bowerman reports 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.'

Pinker (1989) underlines 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 upon to 'cut back' unacceptable extensions. Thus, there is no logical procedure children can use to acquire the causative alternation.

Pinker outlines 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 feels 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.

The problem grows much worse when one realizes the enormous disparity between languages in the forms and productivity of the causative. Hiromi Morikawa's (1991) discussion of Japanese causatives provides a good illustration. I will use the Mayan language K'iche' to further underline the cross-linguistic differences. K'iche' has an agglutinating morphology which reflects the distinction between transitive and intransitive verbs in several respects (see 1).

The language has an ergative cross-referencing system on the verb, so intransitive verb subjects are marked with an absolutive marker and transitive verb subjects are marked with an ergative marker. Many verbs also require a special clause-final termination which distinguishes between transitive and intransitive verbs.

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

K'iche' uses the suffix */-is/* 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 */-is/*

a. k-Ø-a-poqow-is-a:j
INCOMP-3A-2E-boil-CAUSE-TV

'You are boiling it.' (= cause to boil)

b. k-Ø-in-q'alaj-is-a:j
INCOMP-3A-1E-clear-CAUSE-TV

'I will clarify things.' (= cause to become 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' which do not take the causative affix. The first of these irregular classes uses another means of deriving a transitive verb stem. I will refer to this class of verbs collectively as the 'zero class' although you can see from the examples in (3) that this set of verbs uses several different derivational processes. They have in common the feature of alternating between intransitive and transitive verb forms by some means other than the regular causative derivational process.

(3) K'iche' zero class verbs

Transitive verbs	Intransitive verbs
a. k-Ø-in-qas-a:j INCOMP-3A-1E-go_down-TV	k-in-qas-ik INCOMP-1A-go_down-IV
'I am taking it down.'	'I am going down.'
b. x-Ø-in-tzaq-oh COMP-3A-1E-drop-TV	x-in-tzaq-ik COMP-1A-fall-IV

	'I dropped/lost it.'	'I fell.'
c.	x-Ø-a-sut-i:j	x-at-sutin-ik
	COMP-3A-2E-turn-TV	COMP-2A-turn-IV
	'You turned it.'	'You turned.'

The other set of irregular intransitive verbs I will dub 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 periphrastic construction. Examples of such verbs are shown in (4).

(4) K'iche' periphrastic verbs

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

To put it mildly, the combination of a productive causative derivational affix 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'.

There are two respects in which K'iche' causatives disconfirm Pinker's semantically restricted theory of verb acquisition. Pinker suggests in several places that morphological rules will be more productive than simple lexical alternations like the English causative rule. Accordingly, one would not expect the K'iche' causative rule to have so many lexical exceptions. It appears that morphological causatives have as many exceptions as lexical causatives. By itself this is not a problem for Pinker's theory since morphological causatives may belong to the same narrowly restricted semantic classes of verbs that lexical causatives do. However, this is where K'iche' creates another problem for Pinker's theory in that the K'iche' exceptions crosscut most of Pinker's narrow semantic verb classes.

Pinker provides the set of alternating and non-alternating verb sets for the causative rule in English (130-132) - shown in (5) on the handout.

(5) English causative classes

I. Alternating sets

A. verbs of extrinsic change of physical state
e.g. open, close, melt, shrink, shatter

B. contained motion taking place in a particular manner.
e.g. slide, skid, float, roll, bounce

C. manner of locomotion
e.g. walk, gallop, trot, race, run, jump

D. instrument of locomotion
e.g. drive, fly, cycle, ferry, boat, sail, motor

II. Non-alternating sets

A. verbs of motion in a lexically specified direction
e.g. go, come, rise, fall, ascend, descend, leave, exit, enter, arrive

B. volitional or internally caused actions
e.g. eat, jump, hop, run, drink, sing

C. verbs of coming into or going out of existence
e.g. die, expire, decease, perish, croak, pass away, kick off, vanish, appear, disappear, disintegrate

D. verbs of emotional expression
e.g. smile, cry, laugh, frown, blink

E. verbs of emission
e.g. glow, glitter, shimmer, blaze, howl, whine, shriek, buzz, sing, bubble, erupt, smoke, sweat, ooze, puff, leak, bleed, shed

F. verbs of motion-contact-effect
e.g. cut, slice, hack

These sets can be compared with the causativizable and noncausativizable verbs in K'iche' shown in (6) below (cf. Pye 1989).

(6) Causative Verb Types in K'iche' Maya

Alternating Verbs			Non-alternating Verbs	
Use *-is* suffix		Zero class		
die	forget	break	come	go
boil	recommend	dream	eat	arrive here
travel	climb	fly	rest	gather
sleep	bathe	fall/drop	swim	stroll
arrive there	remain	finish	be tired	exist
shine	look	shake	talk	leave
wet	extinguish	lower	play	be capable
pass	be sick	move	be silent	get better
grow	become small	return	open	wait for
become crowded	hurry	vomit	use	throw
tickle	bite	sad	work	spit
plant	light	spin	want	know
wash	tear	cry	think	win
smash		sing	endure	tie
			laugh	buy
			love	burn
			scold	mock
			weave	show
			steal	

Pinker's theory predicts a language might choose which classes to alternate but not divide the classes in arbitrary ways. The cross-linguistic evidence indicates that in fact languages do distinguish between alternating and non-alternating verbs in an arbitrary manner.

Note in particular that Pinker's non-alternating subclass of verbs of motion in a specified direction has several K'iche' equivalents which alternate (climb, arrive there, travel, remain, return), and several which do not (go, come, arrive here, stroll, leave). Therefore narrow semantic verb classes are not a viable explanation of the acquisition of constraints on causatives (Bowerman 1988 has published a different critique of narrow range semantic classes to the same effect).

Pinker might claim that the narrow range semantic classes really reflect the ways in which languages are sensitive to particular semantic features in verb meaning, e.g. direction, manner, contact. Languages would then exhibit more variation by showing sensitivity to different verb meaning features. What is not clear is how the differences between K'iche' and English can be captured using the same set of semantic features. Adding a new set of ad hoc features to capture the K'iche' verb classes would not insure that the combined set would capture anything about the next language analyzed.

Spontaneous language samples suggest that the causative derivation is a fairly late acquisition for K'iche' children. I have found that by 2;10 the children are beginning to produce examples of causativized verbs (Pye 1990). Their causativized verbs alternate with the intransitive verb forms, sometimes in the same session, so there is evidence that the children have extracted a productive morphological alternation. However, I have not found any overgeneralizations of the causative affix in this data set. The children are using verbs from the irregular class of intransitives, however they never added the causative affix to them. Neither did they add the causative affix to transitive verb stems.

This result appears to contradict acquisition data from other languages in which causative overgeneralizations appear to be more frequent. Bowerman (1974) has provided many examples of such overgeneralizations in English, and Berman (1982) noted examples from the initial stage of learning Hebrew. I do not think the difference can be attributed to differences between the ages of the subjects. Bowerman and Berman have noted many examples of causative overgeneralizations from children younger than 3;0.

Needless to say I was curious about this apparent discrepancy between the spontaneous language samples from K'iche', English and Hebrew so I decided to see if I could elicit any causative overgeneralizations from K'iche' children. I put together a test of their ability to form causatives using verbs from all three groups. The verbs are shown in (5).

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

A. Type of causative derivation

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

B. Pinker's narrow semantic classes

Alternating

Change of state: ch'aqt-is, noj-is, atin-is

Non-alternating

Directed motion: aq'an-is, qasaj, elik, petik
Volitional action: xojow-is, sutin, muxanik, wakatik
Existence: wulik

Table 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.

Table 1. Ideal Response Pattern

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

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 2.

Table 2. Causative Data (Summer 1990)

	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)			18% (3/17)		
Total Percent	10% (11/107)			8% (49/575)			8% (5/63)		

The most significant feature, I suppose, is that we actually succeeded in eliciting some causative overgeneralizations from the children. Some children added the causative affix to the zero class verbs *qasik* '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*, while their zero derivation for *wakatik* 'walk' was *wakati:j*.

I was not prepared to find the children overgeneralizing these verbs so frequently. Maratsos (1979) estimated that Bowerman's 100 or so utterances were culled from approximately 750,000 utterances. The 2- to 4-year-old subjects in Braine et al's study of the English causative alternation overgeneralized intransitive verbs in 39% of the trials while Maratsos et al. (1987) report a mean overgeneralization rate of 26%. Seventy-three percent of the youngest K'iche' subjects extended the causative to the verb *muxanik* 'swim', while 43% extended the morphological causative to the verb *qasik* 'go down'. Only 33% of the oldest subjects extended the causative to the verb *muxanik* 'swim'.

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 (1989.289) states that Christy made such overgeneralizations over a period of six 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 since such changes would lead to more abrupt 'across-the-board' restrictions on the causative. The extended developmental pattern supports Pinker's lexically-based approach in that a gradual change to children's lexical entries for verbs would slowly diminish their tendency to apply the causative derivation inappropriately.

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'. 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 *qasaj* 'go down' while 8 of them overgeneralized the verb *muxanik* 'swim'. None of them overgeneralized the verbs *sutinik* 'turn', *elik* 'leave' and *petik* 'come'. In fact we had to stop 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 bit of data suggests another important difference between children learning K'iche' and those learning English. Pinker (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'. Pinker's theory does not predict this difference. I think this finding points to an important cross-linguistic difference in the way the structure of the lexicon influences children's willingness to assign the verbs transitive argument structures. Some feature beyond verb meaning affects

children's willingness to causativize verbs.

Another interesting finding was that 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 e.g. Christy (2;9) 'I'm gonna just fall this on her.' In fact, this is the phenomenon that Braine and Maratsos succeeded in eliciting from their subjects. 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.

Braine et al. propose 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. demonstrate. 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 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 (cf. Pye 1985).

I think this data, admittedly preliminary, supports a number of conclusions about the process children use to constrain the causative alternation. The first is that children cannot rely upon narrow range semantic restrictions to correct their causative overgeneralizations. This is because there are arbitrary cross-linguistic differences with respect to lexical restrictions on the causatives. The semantic primitives that Pinker uses to define his narrow range verb classes only admit a limited degree of variation, not the arbitrary recombinations seen in the linguistic data. Another failure of the narrow range semantic constraints hypothesis is that it does not account for the cross-linguistic differences in children's willingness to causativize particular verbs. It cannot explain why K'iche' children show such reluctance to causativize the verb *petik* 'come' while English-speaking children causativize the verb 'come' with seeming abandon. Since the meaning of these verbs is as similar as verb meanings can be in different languages, some factor beyond verb meaning must affect children's tendency to causativize verbs.

A second conclusion is that causative overgeneralizations do not reflect immature semantic representations for verbs. Again, this hypothesis does not explain the cross-linguistic differences in the frequency with which children overgeneralize specific verbs. One would have to assume that K'iche'-speaking children acquire the adult semantic representation of *petik* 'come' before English-speaking children acquired one for 'come'. Even if this were the case, it would indicate that some factor in addition to verb meaning was at work. By Occam's Razor, the best thing to do under the circumstances is to factor out verb meaning and look for this additional factor. Another difficulty with the immature semantic representation hypothesis is that it is not compatible with the extended period of time children require to develop causative restrictions. I would think that thirteen-year-olds have a fairly accurate representation of the meaning of *muxanik* 'swim' and *sutinik* 'turn'.

The preceding arguments suggest that lexical retrieval processes must 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 *qasik* and *qasa:j*. Several studies have suggested that children do not always succeed in retrieving the proper word (Hoek, Ingram & Gibson 19). 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 states 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 a certain percentage of instances. The retrieval explanation would also 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 in several places 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 monosylabic 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 *petik* 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 straight forward 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.

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 a verb. One such example is 'These changes don't deteriorate the language'. Even the 1991 Stanford child language conference abstracts contain 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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