

ACQUISITION OF QUEBEC FRENCH STRESS*

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In this paper, we will focus on the acquisition of foot structure in child language. Feet that are strong on the left are referred to as *trochaic* feet while feet that are strong on the right are referred to as *iambic* feet. We would like to investigate whether children have any bias toward acquiring either trochaic or iambic feet. Studies of English production (Allen & Hawkins, 1979,1980) and of Dutch (Fikkert, 1994) and English perception (Turk et al 1995) have argued convincingly for a preference for trochaic (s w) forms. As English and Dutch are both trochaic languages, this leaves the issue of whether trochaic is the default setting open.

We would like to move into an area now which will show how the property of the metrical foot can have a subtle influence on segmental form.

Minimal Words

Demuth and Fee (1995) proposed that early words must fit a developing Prosodic Template that dictates Bimoraic Feet. Thus, the following sequences are all well-formed, as they are bimoraic: CVCV, CVC, CVV. This demonstrates that children do make use of structures such as feet provided by UG. Children have repair strategies to make their words fit this template, shown in (1):

1. (a)	F	(b)	F
	/ \		/ \
	s w		s w
trein	teinə	bənəənə	nənə
			*bəná

In (1a), from Fikkert's Dutch data, an epenthetic schwa is added even though it is absent from the adult input to the child. In (1b) we see deletion of segmental material that is in the input. The unstressed syllable following a stressed syllable (i.e. one in the same foot) is less likely to be deleted than the unstressed syllable preceding a stressed syllable (i.e. in a different foot). This demonstrates that if the input can't be mapped onto a bimoraic foot, children have ways of making it fit. But the question of whether there is a trochaic bias (Allen and Hawkins, 1980) remains.

Early data suggested a trochaic bias but the data were gathered from languages like English and Dutch which are, in fact, trochaic at the word level. Iambic languages needed to be investigated. Archibald (1996) suggested that

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children acquiring Yucatecan Mayan (which he argued to be iambic) did not exhibit a trochaic bias. What about French?

Paradis et al. (1997) showed that Quebec children overwhelmingly tended to preserve the final syllables of their utterances, and to produce an iambic stress pattern (mean age of children 2;8). This argues that French children do not have a trochaic bias, but leaves open the possibility that they went through a trochaic phase before 2;8.

Quebec French Stress

Traditional views of French phonology (e.g. Fouché, 1934; Garde, 1968) have assumed that primary stress falls exclusively on the final syllable of the intonational phrase, as the examples in (2) will show:

2.

[fɔtó]	<i>photo</i>	photo
[fɔtografík]	<i>photographique</i>	photographic
[sənəpafɔtografík]	<i>ce n'est pas photographique</i>	it's not photographic

Walker (1984) noted that stress in Quebec French was sometimes non-final. This is also supported by Paradis and Deshaies, 1990; Ouellet and Thibault 1996, and Ouellet and Tardif 1996) who note that the non-final stresses are frequently penultimate (where the stress may be shifted to an earlier syllable which had particular vowel quality or coda structure).

We raise these issues to point out that our initial assumption that the children were acquiring a strictly iambic language may not be true. There are clearly complex issues to be sorted out as to the final state of acquisition. There is also some discussion as to the nature of the input to children in French. The samples of motherese that we have recorded, have included examples of both falling pitch contours on words which would not appear to allow that in adult to adult speech, e.g. un *cánard*.

Methodology and Data Collection

Data collected as part of a larger project seeking to compare the acquisition of French and English prosody. All of these children have been recorded for approximately one year, and we are in the process of entering the data. In this paper, we will report on an analysis of their earliest utterances.

Five children participated in the study. Three French-speaking children (J, N, D), and two English-speaking children (E and M). We note, however, that J had an English nanny and therefore had more exposure to English than did N and D. All the children were female. Ages of the children in the sessions analyzed are presented in (3):

3.

Child	Session	Age (Y;M)
E	5	1;7
M	6	1;9
D	1	1;3
D	2	1;4
D	3	1;5
N	1	1;6
N	2	1;7
J	1	1;9
J	1	1;10

The children have been recorded using a Shure LX14 wireless microphone with a Countryman EMW (Flatcurve) Lavalier on a Tascam DA-20 DAT machine in spontaneous play approximately once a month between the ages of 1;6 and 3;0. The DAT tapes are recorded with full 16 bit depth at a sampling rate of 44.1 kHz. A native speaker of Quebec French transcribed French children. Individual words are transcribed and digitized and then analyzed on SoundScope 8 to determine both the duration of the syllable rhymes and the prominence patterns. The word is normalized and saved with a 70ms margin at the beginning and end to avoid undesirable clipping of word-edge sounds. These data are entered into a Filemaker Pro database in which we have created a number of calculation and summary fields.

Previous Analyses

Archibald and Mills (1999) showed that E (an English speaker) was treating trochaic feet very differently than iambic feet, as illustrated in (4).

4.

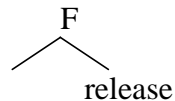
Target Trochee; produced trochee: (all single words) E.g. snoring, morning, Humpty, muffed, yellow	34
Target iamb; produced trochee: (all phrases) E.g. my chair, then green, lie down	3
Target iamb; produced iamb: (13 phrases; 2 words) E.g. what's that, again, a cow	15
Target trochee; produced iamb:	0

Release as a Repair Strategy

They noted a new repair strategy that E uses to maintain a Minimal Word. Given the fact that E had a large number of coda consonants, they argued that she was using a strong release on these final consonants as a kind of nucleus for a syllable that would allow her to place these consonants in an onset position. In other words, they argued that sequences of the kind shown in (5), actually have the structure shown in (6).

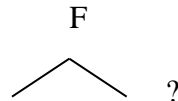
5. CVC^h
 ↖ ↗
 Onset? Coda?

6.



As expected, E utilised this repair strategy more often on words with an odd-number of syllables (e.g., clock, kitty cat) than she did on words with an even number of syllables. The only exceptions were bisyllabic words where she shifted the stress inaccurately onto the final syllable (e.g., jackét). Each of these utterances ends in a strong syllable. The child has demonstrated a trochaic bias, so perhaps she is taking the final strong syllable as the head of a foot. We suggest that the child maps feet onto these words as shown in (7):

7.



This leaves a space in the second foot into which a repair strategy would tend to insert material, such as the releases observed.

New Data

Syllable rhymes for English and French-speaking children were calculated using spectrograms. As length is the primary indicator of stress in French (Walker, 1984), let us first examine syllable rhyme means in milliseconds according to stress type and syllable position, shown in (8).

8.

Syllable Type	Mean in milliseconds	# Tokens
Stress Final	440	149
Non-stressed Final	300	44
Stressed Non-final	176	65
Non-stressed Non-final	143	123

We see in (10) that final syllables, whether or not they were perceived as stressed, are longer than syllables in non-final position. We also note that although there is about a 33 millisecond difference between non-stressed final syllables and stressed non-final syllables, the difference is not large enough to force us to suggest that the French-speaking children have acquired non-final syllable lengthening, a characteristic of Quebec French. This may be as expected, as Armstrong (1999) asserts that non-final lengthening is optional in Quebec French in many cases.

Consonantal Release

We have seen that in English, one strategy children may use to fill a foot is the strong release. This strategy works well for English, because English has many words which end in releasable consonants. In the sessions recorded, common English words were ‘cat’, ‘hat’, ‘clock’ and ‘duck’. One question that arises from this hypothesis is whether children acquiring other languages use the same strategy to facilitate foot-building. In examining the French data, we note that common words in the sessions did not have releasable final consonants. Words such as ‘aider’, ‘minou’, ‘cheval’, ‘vache’ and ‘merci’ do not end in releasable consonants. In all the sessions analyzed so far, only two released consonants were measured, shown in (9):

9.

Child	Age	Word	Release in Milliseconds
D	1;5	‘tete’	197
J	1;9	‘cinq’	199

Although the amount of released consonants is so small, it is not possible to make generalizations, we do note that the released consonants are fairly long, certainly long enough to fill in a foot. In both cases, it is possible that the children were indeed filling in a foot. However, given the small amount of words with releasable consonants in French, it is not clear whether this is in fact a productive strategy, or the children practicing and possibly over-exaggerating released consonants.

Stress Retraction

We have noted that stress in French occurs in final position, and that it may sometimes be retracted to penultimate position. Although we have noted that perceived stress on non-final syllables was not significantly longer than that of unstressed non-final syllables, the kinds of syllables that are stressed may tell us something about what kind of template children of this age learning French might have. For example, if all the stressed non-final syllables occur in environments where one expects stress retraction in adult French, then we can assume that the children have acquired stress-retraction in French, and it is simply not yet perceivable to adults. If, on the other hand, children stress non-final syllables that one does not expect to be stressed in Quebec French, then we may have evidence for some kind of parsing strategy, possible trochaic bias, or influence of motherese. We noted earlier that motherese sometimes employs a trochaic stress pattern when the adult form would not.

According to Armstrong (1999), we expect stress retraction in environments with higher-mid vowels, nasal vowels, or a lengthening consonant in the coda (voiced sonorant consonant such as /r/). Some examples of the French children's utterances including retracted stress include the examples shown in (10):

10.

Child	Age	Token	Expected (E)/ Not Expected (U)
D	1;4	[mínu] 'minou'	U
D	1;4	[mázi] 'merci'	U
D	1;4	[céde] 'aider'	U
D	1;5	[bábaj] 'byebye'	U
D	1;5	[kánaw] 'canard'	U
D	1;5	[aló baba] 'allo papa'	E
D	1;5	[edé māmā] 'aider maman'	E
N	1;3	[ʔáwa] 'ciseaux'	U
N	1;3	[ʔómɔʁ] 'homard'	E
N	1;3	[túde] 'tombe'	U
J	1;9	[ʒíʔa] 'giraffe'	U
J	1;10	[kúla:] 'couleur'	U
J	1;9	[púsẽ] 'poussin'	U

Of the tokens with non-final stress, 75% have unexpected stress according to recent claims about stress retraction in Quebec French. The data in (11) show the breakdown by child, and the total.

11.

Child	Total Stressed Non-final Syllables	Unexpected Stress Retraction	Expected Stress Retraction
D	25	20	5
N	10	9	1
J	32	21	11
Total	67	50	17

We therefore do not have evidence that these French-speaking children are retracting stress according to the rules of Quebec French. Two possibilities now present themselves: 1) children are retracting stress because they hear stress-retraction in the input. This possibility is brought out by the observation that many of the utterances where the children retracted stress were repeated after utterances with the same stress as the mother. In other words, mothers were producing incorrect adult forms with retracted stress. 2) children are retracting stress because this fits their trochaic template. Therefore, if the children do have a trochaic bias, this mistake is explained by the simple fact that the forms they are producing conform to their template, and they are in the process of setting this parameter to match the iambic pattern of French.

Types of Feet Produced by French Children

It will also be useful to look at the type of feet produced by the French children. This will help us determine what types of mistakes were made, which may in turn tell us something about what kind of template the children have. Utterances were coded as iambic or trochaic if they had either an alternating pattern of ws or sw – this analysis does not just include bisyllabic utterances. An utterance was coded as ‘Target Unknown’ when it could have been produced with either stress pattern. An utterance was coded as ‘Produced Level’ when it was produced with level stress. Totals for all Children, are shown in (12):

12.

Target versus Produced	Total number	Percentage
Target Iambic, Produced Iambic	70 / 185	37%
Target Iambic, Produced Trochaic	15 / 185	8%
Target Trochaic, Produced Trochaic	26 / 185	13%
Target Trochaic, Produced Iambic	0	0%
Target Unknown, Produced Iambic	5 / 185	1%
Target Unknown, Produced Level	13 / 185	5%
Target Unknown, Produced Trochaic	17 / 185	7%
Target Iambic, Produced Level	22 / 185	23%
Target Trochaic, Produced Level	2 / 185	1%
Monosyllabic Utterances	64	26%

Here we notice that the highest percentage of utterances were utterances that had iambic targets, and were produced with iambic stress. We note, however, that this does not account for the majority of the utterances (only 37%), and that there is still quite a bit of variation. All together, utterances produced with level stress account for almost 29% of the data. Iambic targets were not always produced with

noticeable iambic rhythm. These types of utterances account for 23% of the data. Relatively few clear errors occur, however, accounting for less than 10% of the data. These cases occurred when the target was iambic, but produced with trochaic rhythm, or the target was trochaic and produced with iambic rhythm. We also note that the number of target trochees and produced trochees may be inflated by J's data, which contained the majority of this type of utterance. N and D produced target trochees mainly through imitation.

Truncation

The examination of children's patterns of truncation can give us valuable information about what kind of structures they like to build, and are building. For example, if children tend to add unstressed syllables at the end of monosyllabic words, we can surmise that they have a trochaic template, and that they add the unstressed syllable to complete the trochee. If, however, children add unstressed syllables to the beginning of a monosyllabic word, we have evidence that they may have an iambic template, and that they are building iambs. By the same token, where children tend to omit syllables also gives us valuable information about their mental representations and their preferences for rhythm.

For the French children we noted:

- D shortened to 2 syllable utterances, omitting mainly function words: [œ ká] 'un cheval', [ʔe ʔu] 'il est ou'?
- D omitted many function words (such as articles and pronouns): [no pátibizi] 'non, se pas brise', [ki kɛjõ] 'c'est des crayons', [œ ká] 'un cheval'
- D also added syllables – this may be that she was still just babbling: [no pátibizi] 'non, se pas brise', [tœvájnamamá:] 'cheval maman'
- J had some one syllable truncations: [zu] 'Grisou', [kuz] 'excuse', [sõ] 'poisson'
- J all syllables cut were non-final, unstressed syllables: [ʒœni e: ti] 'Joannie est parti', [sã] 'ressemble', [tit fi:] 'petite fille', [sa se o:le] 'sa c'est violet'
- N truncated to one-syllable utterances. All cut syllables were non-final, unstressed syllables: [zõ] 'maison', [nɛ] 'minou'
- Final syllables were universally preserved.
- Also note that the French children have the same frequency of truncation occurrences as English children did, as can be seen in (13):

13.

Language	# tokens truncated / total # truncatable tokens	Total Percentage
English	31 / 179	17%
French	30 / 166	18%

Given the large number of French truncations to monosyllables, we observe that French children do not seem to be truncating to create iambs. This suggests that while in English stressed *and* final syllables are important, and therefore, English children build bi-syllabic structures, in French, stressed and final syllables are the same, therefore that is the syllable that is most often preserved.

French children exhibited two interesting tendencies shown in (14). 1) If stress was retracted, a two-syllable word was produced 2) If stress was not retracted (ie. On the final syllable), then a monosyllable was produced.

14.

RETRACTED STRESS – TWO SYLLABLES PRESERVED	FINAL STRESS – ONE SYLLABLE PRESERVED
[œde] ‘aider’	[de] ‘aider’
[mínu] ‘minou’	[nu] ‘minou’
[máde] ‘merci’	[ʒœni e: ti] ‘Joannie est <u>parti</u> ’
[púsẽ] ‘poussin’	[sa se o:le] ‘ca c’est <u>violet</u> ’
[kúləu] ‘couleur’	[sã] ‘ressemble’
[kánaʷ] ‘canard’	[kuz] ‘excuse’
[ʒíʔa] ‘giraffe’	[sõ] ‘poisson’
[ʔómaʃ] ‘homard’	[zu] ‘Grisou’
[túdə] ‘tombe’	

Conclusion

Our investigation of French production in these children has revealed the following patterns:

- they don’t have release as a repair strategy in the same way as the English children, but the data are very limited
- like the input they are exposed to, the stress sometimes shifts to the left. However, the children do not seem to be shifting in environments like those of the adults.
- consistent with Paradis, et al. French children do tend to keep final syllables and to produce final stress
- whether this is an iambic foot is less clear. The subjects certainly do not seem to be repairing their productions to produce iambic feet in the same way that the English children were to produce trochaic feet. They never produce a word like “poisson” as [əʃõ]. However, when they retract the stress the penultimate syllable can be retained. This would seem to suggest that the child is not operating upon an iambic foot structure, but rather is obeying constraints couched in terms like “keep the final syllable” and “keep the stressed syllable.” Usually these two are the same, but when stress retracts, they are able to keep two syllables. Further support for this analysis will await the children producing longer words.

We look forward to adding more data to this data base to see the patterns which emerge.

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