CHAPTER IV

Results and Discussion

Table 3 below shows the complete phonemic transcriptions of the narrative and wordlist tokens uttered by the four informants resulting from the process described in section 3.5. Codas are listed in alphabetical order. Vowels and onset phonemes are only approximate. The basic errors of deletion, substitution (voicing and feature), vowel addition, and metathesis are described in detail in following sections.

TABLE 3: TRANSCRIBED CODA TOKENS

Task		Narrative	Narrative	Narrative	Narrative	Wordlist	Wordlist	Wordlist	Wordlist
Informant		1	2	3	4	1	2	3	4
Word	Coda								
lied/tried	/aɪd/	laɪ	laɪ	laɪ	laɪ	traɪt	traɪ	traɪt	traɪ
tries	/aɪz/					traɪs	traɪs	traɪs	traɪs
described	/aɪbd/	deskraɪb	dɪskraɪp	diskraɪpdə	dɪskraɪ				
besides	/aɪdz/	bisaɪs	bisaɪt	bɪsaɪ	bɪsaɪ				
allowed/crowd	/aʊd/	kaʊt	kraʊ	kraʊ	kaʊt	ɑlaʊt	ɑlaʊt	ɑlaʊdɛt	ʌlaːʊf
cows	/aʊz/	kaʊs	kaʊs	kaʊ	kaʊ	kaʊs	kaʊs	kaʊs	kaːʊfs
avoid	/ɔɪd/	əwɔɪt	ʌwɔɪʔ	əwɔɪʔ	ʌwɔɪʔ				
enjoyed	/ɔɪd/	endʒɔɪʔd	entʃɔɪ	entʃɔɪ	entʃɔɪt	entʃɔɪn	entʃɔɪ	entʃɔɪt	entʃɔɪt
boys	/ɔɪz/	bɔɪs	bɔɪʔ	bɔɪs	bɔɪʔ	bɔɪs	bɔɪs	bɔɪs	bɔɪs
rubbed	/bd/					rʌpt	rʌp	rʌppɛt	rʌp
jobs	/bz/	tʃʌps	tʃɒp	dʒɒps	tʃɒʔ	tʃɒps	tʃɒps	tʃɒps	tʃɒps
birds/needs	/dz/	bəːs	bəːd	bəd	bəːd	nits	nit	nits	nit
judged/managed	/dʒd/	manetʃt	mæneʃ	mæneʃ	mæneʃ	tʃʌʔt	tʃʌts	tʃɛtʃəʔ	tʃʌ tʃ
beliefs	/fs/	bilifs	bilif	bəlifs	bilif	bilifs	bilif	bilif	bilif
laughed/lift	/ft/	lɪf	rɪf	lɪf	lɪf	læf	læf	læftɛt	læf
dragged	/gd/	drækt	træk	drækə	dræʔ	dræk	drækdəʔ	drækdəʔ	drækɛʔ
eggs/pigs	/gz/	eks	eks	eʔ	eʔ	pɪks	pɪk	pɪk	pɪk
makes	/ks/	meɪks	meɪ	meɪks	mek	meks	meks	meks	meks
fixed	/kst/	fɪks	fɪks	fɪks	fiʔ	fɪkst	fɪks	fɪksdə	fɪkt
act	/kt/	pɪkt	pɪk	pɪk	pɪʔ	ækt	æk	ækt	ækt
called	/ld/	kalt	kɔt	kɔl	kɔː	kɒlt	kɒl	kɒlɛt	kɒt
tells	/lz/	telʔ	tel	tel	tel	tels	tel	tels	tews
films	/lmz/	fims	fəːms	fim	flim	fims	fims	fims	flims

/Continued

Table 3-- Continued

Task		Narrative	Narrative	Narrative	Narrative	Wordlist	Wordlist	Wordlist	Wordlist
Informant		1	2	3	4	1	2	3	4
Word	Coda								
helped	/lpt/	hel?	hel?	help	hel	helpt	help	help?	help
belts/results	/lts/	risaʊs	risʌl?	risalts	risʌl?	belt	belt	bel?s	bels
solved	/lvd/	sɒft	sɒvt	sɒv	sɒf	sɒft	so:ft	safdə	sɒf
solves	/lvz/	sɒfs	sɒf	sɒfs	sɒf	sɒfs	slouf	safs	sɒfs
seemed	/md/	sim	sim	sim	sim	simt	sim	simdə	sim?
seems	/mz/	sim	sim	sim	sim	sims	sims	sims	sims
lamps	/mps/					læms	lʌmf	læmps	læm
camped	/mpt/	kæmt	kæm	kæmpet	kæmp	ʃæm	kæmf	kæmpet	kæmp
and/rained	/nd/	æn	en	æn	æn	ren	ren	rent	ren
once/sense	/ns/	wʌns	wʌns	wʌns	wʌns	sens	sens	sens	sens
chickens/means	/nz/	tʃɪkens	tʃiken	tʃɪkens	tʃiken	mins	mins	mins	mint
against/sensed	/nst/	əgens	ʌkens	agens	ʌgens	senst	sens	sensdə	sent
changed	/ndʒd/	tʃent	tʃens	tʃentʃet	ʃen	tʃentʃ	tʃentʃ	tʃentʃet	ʃent
launched/pinched	/ntʃt/	lantʃt	lantʃ	lɔntʃ	lantʃ	pɪntʃt	pɪntʃt	pɪntʃ?s	pɪntʃ
belonged	/ŋd/	bɪlɔŋd	bilɒŋ	bilɔŋ	bilɒŋ	bilɒŋkt	bilɒŋk	bilɒŋkɛt	bilɒŋ
sings/things	/ŋz/	θɪŋs	dɪŋ	θɪŋs	tɪŋ?	sɪŋs	sɪŋs	sɪŋs	sɪŋt
thinks	/ŋks/	θɪŋks	θɪŋs	θɪŋks	dɪŋs	θɪŋks	θɪŋks	θɪŋks	dɪŋs
linked	/ŋkt/	lɪŋt	lɪŋdɛt	lɪŋtet	lɪŋ	lɪŋt	lɪŋk	lɪŋkɛt	lɪŋk
lips/steps	/ps/	steps	step	stebs	steb	lɪbs	lɪpf	lɪps	lɪbs
adopt/hoped	/pt/	ʌdɔp	ʌdɔp	ʌdɔp	ʌdɔp	hopt	hok	hoptɛ	hop
risks/tasks	/sks/	rɪsk	rɪs	rɪss	rɪs	tæksk	tæks	tæsk	taks
asked	/skt/	ask	æs	as	aks	æsk	as	æstɛ?	æks
must/passed	/st/	mʌs	mʌs	mʌs	mʌs	pæst	pæs	pæs	past
washed/wished	/ʃt/	wɑʃ	waʃ	waʃ	waʃ	wɪtʃ	wɪʃ	wɪʃt?	wɪtʃ
cats	/ts/	kæts	kæt	kæts	kæts	kæts	kæts	kæts	kæts
reached/watched	/tʃt/	wɑst	watʃ	waʃes	waʃ	rɪst	rɪʃ	rɪtʃtə	ritʃt
deaths	/θs/	des	det	deθ	det	dets	det	dets	det
moved/saved	/vd/	muft	muf	muf	muf	seft	sef	seft	sef
gives	/vz/	gɪvs	gif	gɪf	/kif	gifs	kifs	kifs	/kif
used	/zd/	juzt	jus?	just	jus?	just	jus	just	just

4.1 Deletion

Deletions (Appendix G) of the first consonant (most often of /l/) in a coda ranged from 2 to 6 occurrences per task among the four informants; the average was 3, or 11% of all deletions. Notably, /l/ after mid vowels (such as /e/) and before consonants (as in "helped", "belts", "tells") was usually articulated, but was deleted after most other vowels—the respective retention percentages were 95% and 22%. Deletions of the medial consonant (most often of /k/) ranged from 1 to 7 among the four informants; the average was 3 (also 11%). Final consonants in a coda accounted

for 78% of all deletions, and an average of 23 per informant-task. While the percentages of first, medial, and final coda consonant deletions remained constant through the two tasks, deletions as a whole were more prevalent (54 more occurrences) in the narratives (total, 143) than in the wordlists (total, 89). This was to be expected for two reasons: connected speech usually can involve deletions of the final consonant (section 1.4.2); less formal tasks, such as narratives, usually involve more deletions than more formal tasks, such as reading wordlists (section 2.3.1). There were also other factors evident.

4.1.1 Final Consonant Deletions

Connected speech might have caused the following 11 complex coda deletions (elisions) in the narratives with native speakers, as shown in the following figure:

Figure 1 Connected Speech Elisions

	Connected Speech	Elision	Effective Speech
1.	changed/some	(/ndʒd/→/ndʒ/)	change some
2.	managed/to	(/dʒd/→/dʒ/)	manage to
3.	moved/to	(/vd/→/v/)	move to
4.	linked/to	(/ŋkt/→/ŋk/)	link to
5.	helped/to	(/lpt/→/lp/)	help to
6.	must/be	(/st/→/s/)	muss be
7.	picked/the	(/kt/→/k/)	pick the
8.	seemed/to	(/md/→/m/)	seem to
9.	belonged/to	(/ŋd/→/ŋ/)	belong to
10.	deaths/show	(/θs/→/θ/)	death show
11.	gives/solves	(/vz/→/v/)	give solves

Nine of these 11 medial consonant /d/ or /t/ elisions involve the past tense –ed inflection, which Section 1.4.2 pointed out occur much more often than medial consonant /s/ or /z/ elisions involving –s inflections.

Were the same connected speech patterns operative for the Thai informants? On the positive side of the ledger, with informant #1, "must", "helped", and "seemed" deleted /d/ or /t/ in the narrative, but not the wordlist; informant #2 deleted the /z/ in "gives" in the narrative, but not the wordlist; informant 3 deleted the final consonants in "moved", "deaths", "gives", "picked", "seemed", and "belonged" in the narrative, but not the wordlist; with informant #4, "solves" retained a devoiced /z/ final and "seemed" a glottal stop substitution in the wordlist, but were deleted in the narrative. "Must" and "picked" had deleted final /t/ in the narrative, but not the wordlist. In all there were 14 positive indications. There were two contra-indications: informant #1 deleted /d/ in "judged" in the wordlist, but not the /d/ in "managed" in the narrative, and informant #2 had a paragoge of "linked" (/ŋkt/) in the narrative, while the final /t/ was deleted in the wordlist. Thus connected speech was a factor in the higher occurrences of coda final deletions in the narratives, being responsible for 12 net deletions out of 54. The more experienced informants 1 and 3 evidenced more connected speech deletions (8) than the less experienced informants 2 and 4 (4).

Many other codas preceding words beginning with consonants suffered deletion of the final phoneme when connected speech patterns would not have predicted such a deletion: *jobs* (2), *makes* (2), *fixed* (3), *films* (2), and *seems* (4)—13 deletions in all, to just list the most numerous, and hence, a larger factor than the 12 net connected speech deletions above. Thus, it may be a misnomer to term these deletions 'connected speech' elisions, as they can appear in many different environments. There were even final elisions that appeared before words beginning with vowels.

What else was responsible for the increase in narrative final consonant deletions over the wordlists? Another possible factor was different grammatical form.

Five coda types were inflected in the wordlist: "passed" (1 deletion), "hoped" (2), "sensed" (2), "rained" (3), and "laughed" (3), and uninflected in the narrative: "must" (4), "adopt" (4), "against" (4), "and" (4), and "lift" (4); and one coda (/kt/) was inflected in the narrative, "picked" (3), but not in the wordlist, "act" (1). Thus, there were 14 deletions among the 6 inflected words, and 21 deletions among the 6 uninflected words of equivalent coda type. Although "act" was pronounced with only one deletion, and all other uninflected forms consistently deleted the final consonant, deletion differences between inflected and uninflected forms only accounted for 9 more narrative deletions. Connected speech and inflection status, while certainly factors, together only accounted for 21 deletions, or about 2/5 of the difference between wordlist and narrative final phoneme deletions. The balance of deletions in the narrative was apparently due to the less adept informants rushing the narrative. That these less advanced informants had already displayed many more final deletions in the wordlists (32+23 = 55 total) than had their more experienced peers (9+5 = 14 total) indicates that the narratives induced the weaker speakers to err.

4.1.2 Individual Informant Deletion Strategies

Perhaps because of her one-year residence with a NS family as an exchange student, and her probable communication breakdowns resulting from the non-use of the inflections while living there, informant 1 displayed by far the fewest deletions of final coda consonants in the narrative (12). In some cases she chose to retain the final consonant while deleting the first or medial consonant: *birds* [bɜ:s] instead of [bɜ:d], as uniformly spoken by all other informants; *besides* [bisaɪs] instead of [bisaɪt], as spoken by informant 2; *camped* [kæmt] instead of [kæmp], as spoken by informant 4;

deaths [dess] instead of [det] (informants 2 and 4) or [deθ] (informant 3). That she chose her battles, or planned which coda finals to pronounce, is shown by the fact that the uninflected codas in the narrative were usually deleted. But she was the only informant to pronounce several other inflected narrative coda finals: *managed*, *dragged*, *picked*, *called*, *launched*, *belonged*, *watched*, *moved*, and *gives*. This undoubtedly contributed to the ease of understanding which was later apparent in the overall auditor assessment of the informants (Table 6, page 105).

Informant 4 displayed an opposite strategy to that of Informant 1. Where the latter often sacrificed a non-essential first or medial consonant in order to retain the inflection in the narrative, viz., *birds* [bɜ:s], *besides* [bisaɪs], *camped* [kæmt], and *deaths* [dess] (the first two tokens evidenced lengthened vowels indicating the missing /d/), informant 4 often chose to retain the inflection by more radically compromising the stem in the wordlist. Thus, there are *fixed* [fɪkt], *called* [kɒt], and *sensed* [sent]. In the narrative she tended to delete both consonants, (*called*) [kɔ:]; or substituted with glottal stops: (*fixed*) [fɪʔ].

Informants 2, 3, and 4 had 35, 29, and 37 narrative final consonant deletions respectively, or on average almost three times the number of such deletions as informant 1. Informant #4 had 14 more narrative than wordlist final consonant deletions, and informant #3 had 24. However, 13 of the latter occurred with codas that experienced epenthesis or paragoge in the wordlists. Informant 3 tended to revert to a more Thai way of speaking (Section 3.5.2.3) when uttering sentences, and reserved epenthesis and paragoge for more formal tasks, such as reading wordlists.

Perhaps informants 2 and 4 decided to set a pace which is realistic for native speakers; informant #2 read her narrative in about two minutes, and informant #4 in 1

¾ minutes, and the narrative contains 245 words. That is over 120 words per minute. On the other hand, Informant #1 took a leisurely 2 ½ minutes (about 100 words per minute), and informant #3 was intermediate between informant 1 and 2. Although the words were not unusual or unfamiliar to them, the only preparation the informants had was reading aloud the wordlists, which greatly overlapped with those words analyzed in the narratives. They also had a couple minutes to silently read the narratives.

4.2 Substitution

There were 228 substitutions in the wordlists and narratives (Appendix H) of which 77% (176) were voicing substitutions. These included:

1. /z/→[s] (29% of total substitutions)
2. /d/→[t] (19% of total substitutions)
3. /v/→[f] (12% of total substitutions)
4. /b/→[p] (6% of total substitutions)
5. /g/ →[k] (6% of total substitutions)
6. /dʒ/→[tʃ] (3% of total substitutions)

The substitutions of /z/ and /d/ were by far the most frequent, as they appeared as the final consonant in voiced codas. Two reverse voicing substitutions were present, namely, /p/ →[b] (1%) and /t/ →[d] (1%). Feature substitutions accounted for 23% of total substitutions, and the most common one was /θ/→[t] (3%). There were 24 separate types of feature substitutions, one third (8) of which were glottal stop substitutions. Glottal stop substitutions occurred 21 times or 9% of all substitutions. Informant 4 used them 10 times in her narrative alone, and informant 2 used them 4

times in her narrative, but the other two informants averaged only about one glottal stop substitution per task.

The wordlists had 110 voicing substitutions and 23 feature substitutions, of which 4 were glottal stop substitutions. Thus the percentages were: 83% voicing substitutions, 14% other feature substitutions, and 3% glottal stop substitutions. More proficient speakers (informants #1 and #3) used voicing substitutions more often than the average (88%). Less proficient speakers (informants #2 and #4) used them less often (78% and 75%, respectively), but resorted to feature and glottal stop substitutions (22%, 25%) more than the average (17%).

The narratives qualitatively differed from the wordlists for the less proficient speakers. While informant #1 kept the identical proportions of voicing to feature substitution in the narrative (88%/12%), the less proficient informants #2 and #4 showed (63%/37%) and (43%/57%) voicing to feature substitutions respectively. Informant 3 was intermediate with 77%/23%. Thus, informant #4 had more feature than voicing substitutions in her spoken narrative. The proportion of glottal stop substitutions to total substitutions also grew (to 48%) for this informant #4 in the narrative from only 3% in the wordlist, and 3% overall for all informants in the wordlists. Glottal stop substitutions accounted for about 21% of narrative substitutions for informant #2 and only 6% for informants #1 and #3.

In summary, the more proficient informants 1 and 3 maintained their proportion of mostly voicing substitutions, mainly of the /d/ and /z/ coda finals, and had few occurrences of feature substitutions, including glottal stop substitutions in both tasks. Less proficient speakers were more careful pronouncing the wordlists, but even here displayed fewer voicing substitutions and more feature substitutions (than informants 1 and 3). When reading the narrative, they utilized many more feature and

glottal stop substitutions, including a wider variety of these substitutions. The overuse of the glottal stop was particularly apparent in the narrative of informant 4.

4.3 Vowel Addition and Metathesis

As mentioned in section 3.5.2.3, only one informant (#3) used epenthesis or paragoge to any great extent (about 20 times on the wordlist, but only 6 times in the narrative). There were isolated instances of epenthesis or paragoge from informant #1, "dragged" [drækdəʔ](paragoge) , informant #2: "linked" [lɪŋdet] (paragoge), "dragged" [drækdəʔ](paragoge), and informant #4, "dragged" [drækɛʔ](epenthesis). Metathesis was similarly limited in use to "tasks" [tæksk], informant #1; "tasks" [tæks] and "solves" [slouf], informant #2; "asked" [aks] and "films" [flim], [flims], "tasks" [taks] (informant #4). These instances of metathesis have already been described in sections 3.5.2.4 and 3.5.2.6. Thus, apart from informant # 3, epenthesis, paragoge, and metathesis were employed as occasional strategies only on the most difficult complex codas.

4.4 Coda Scores

Table 4 below lists the scored transcribed wordlist tokens spoken by the four informants. Scores are on a 100-point scale as illustrated in 3.5.2.4. Codas are listed in descending mean score order. The mean wordlist coda score for informant 1 was highest at 74.8, which was the highest mean score in both tasks (wordlist and narrative). Informant 2 had the lowest mean wordlist coda score, though this number was close to that of informant 4.

TABLE 4: WORDLIST TOKEN CODA SCORES

INFORMANT			1		2		3		4	Mean
WORD	Coda	Token	Score	Token	Score	Token	Score	Token	Score	Score
makes	/ks/	meks	100	meks	100	meks	100	meks	100	100
sense	/ns/	sens	100	sens	100	sens	100	sens	100	100
cats	/ts/	kæts	100	kæts	100	kæts	100	kæts	100	100
thinks	/ŋks/	θɪŋks	100	θɪŋks	100	θɪŋks	100	dɪŋs	80	95
lips/steps	/ps/	lɪbs	100	lɪpf	70	lɪps	100	lɪbs	100	93
act	/kt/	ækt	100	æk	60	ækt	100	ækt	100	90
tries	/aɪz/	traɪs	80	traɪs	80	traɪs	80	traɪs	80	80
boys	/ɔɪz/	bɔɪs	80	bɔɪs	80	bɔɪs	80	bɔɪs	80	80
seems	/mz/	sims	80	sims	80	sims	80	sims	80	80
pinched	/ntʃt/	pɪntʃt	100	pɪntʃt	100	pɪntʃ?s	60	pɪntʃ	60	80
passed	/st/	pæst	100	pæs	60	pæs	60	past	100	80
cows	/aʊz/	kaʊs	80	kaʊs	80	kaʊs	80	ka:ufs	64	76
means	/nz/	mins	80	mins	80	mins	80	mint	60	75
sings	/ŋz/	sɪŋs	80	sɪŋs	80	sɪŋs	80	sɪŋt	60	75
fixed	/kst/	fɪkst	100	fɪks	60	fɪksdə	70	fɪkt	60	73
sensed	/nst/	senst	100	sens	60	sensdə	70	sent	60	73
hoped	/pt/	hopt	100	hop	60	hopte	70	hop	60	73
reached	/tʃt/	rɪst	70	rɪʃ	42	rɪtʃtə	80	ritʃt	100	73
enjoyed	/ɔɪd/	entʃɔɪn	70	entʃɔɪ	60	entʃɔɪt	80	entʃɔɪt	80	73
helped	/lpt/	helpt	100	help	60	help?	70	help	60	73
seemed	/md/	simt	80	sim	60	simdə	80	sim?	70	73
tried	/aɪd/	traɪt	80	traɪ	60	traɪt	80	traɪ	60	70
allowed	/aʊd/	ɑlaʊt	80	ɑlaʊt	80	ɑlaʊdɛt	70	ʌla:uf	50	70
beliefs	/fs/	bilifs	100	bilif	60	bilif	60	bilif	60	70
tells	/lz/	tels	80	tel	60	tels	80	teos	56	69
belonged	/ŋd/	bilɒŋkt	80	bilɒŋk	60	bilɒŋkɛt	70	bilɒŋ	60	68
linked	/ŋkt/	lɪŋt	80	lɪŋk	60	lɪŋkɛt	70	lɪŋk	60	68
lamps	/mps/	læms	80	lʌmf	42	læmps	100	læm	36	65
called	/ld/	kɒlt	80	kɒl	60	kɒlɛt	70	kɒt	48	65
rained	/nd/	ren	60	ren	60	rent	80	ren	60	65
jobs	/bz/	tʃɒps	64	tʃɒps	64	tʃɒps	64	tʃɒps	64	64
laughed	/ft/	læf	60	læf	60	læftet	70	læf	60	63
belts	/lts/	belt	60	belt	60	bel?s	70	bels	60	63
gives	/vz/	gifs	64	kifs	64	kifs	64	/kif	50	61
used	/zd/	just	64	jus	48	just	64	just	64	60
tasks	/sks/	tæksk	60	tæks	60	tæsk	60	taks	60	60
dragged	/gd/	dræk	48	drækd?	64	drækd?	64	drækɛ?	56	58
birds/needs	/dz/	nits	64	nit	48	nits	64	nit	48	56
deaths	/θs/	dets	70	det	42	dets	70	det	42	56
saved	/vd/	seft	64	sef	48	seft	64	sef	48	56
rubbed	/bd/	rʌpt	64	rʌp	48	rʌppɛt	56	rʌp	48	54

/Continued

TABLE 4 Wordlist Token Coda Scores--Continued

INFORMANT			1		2		3		4	Mean
WORD	Coda	Token	Score	Token	Score	Token	Score	Token	Score	Score
wished	/ʃt/	wɪtʃ	42	wɪʃ	60	wɪʃt?	70	wɪtʃ	42	54
camped	/mpt/	ʃæm	36	kæmf	42	kæmpɛt	70	kæmp	60	52
pigs	/gz/	pɪks	64	pɪk	48	pɪk	48	pɪk	48	52
judged	/dʒd/	tʃʌʔt	56	tʃʌts	42	tʃɛtʃ?	56	tʃʌ tʃ	48	51
changed	/ndʒd/	tʃentʃ	48	tʃentʃ	48	tʃentʃɛt	56	ʃent	48	50
asked	/skt/	æsk	60	as	36	æstɛ?	49	æks	42	47
films	/lmz/	fims	48	fims	48	fims	48	flims	40	46
solved	/lvd/	sɒft	42	so:ft	42	sɑfdə	40	sɒf	32	39
solves	/lvz/	sɒfs	42	slouf	20	sɑfs	42	sɒfs	42	37
Grand Mean			74.8		62.1		71.8		62.9	68.1

Table 5 below lists the scored transcribed narrative tokens spoken by the four informants. Scores are on a 100-point scale as illustrated in 3.5.2.4. Codas are listed in descending mean score order. The mean narrative coda score for informant 1 was highest at 71.6 and Informant 4 had the lowest mean narrative coda score, though this number was close to that of informant 2.

TABLE 5: NARRATIVE TOKEN CODA SCORES

INFORMANT			1		2		3		4	Mean
WORD	Coda	Token	Score	Token	Score	Token	Score	Token	Score	Score
once	/ns/	wʌns	100	wʌns	100	wʌns	100	wʌns	100	100
cats	/ts/	kæts	100	kæt	60	kæts	100	kæts	100	90
thinks	/ŋks/	θɪŋks	100	θɪŋs	70	θɪŋks	100	dɪŋs	70	85
beliefs	/fs/	bilifs	100	bilif	60	bəlifs	100	bilif	60	80
steps	/ps/	steps	100	step	60	stebs	100	steb	60	80
enjoyed	/ɔɪd/	endʒɔɪʔd	100	entʃɔɪ	60	entʃɔɪ	60	entʃɔɪt	80	75
boys	/ɔɪz/	bɔɪs	80	bɔɪʔ	70	bɔɪs	80	bɔɪʔ	70	75
makes	/ks/	meɪks	100	meɪ	36	meɪks	100	mek	60	74
avoid	/ɔɪd/	əwɔɪt	80	ʌwɔɪʔ	70	əwɔɪʔ	70	ʌwɔɪʔ	70	73
crowd	/aʊd/	kaʊt	80	kraʊ	60	kraʊ	60	kaʊt	80	70
cows	/aʊz/	kaʊs	80	kaʊs	80	kaʊ	60	kaʊ	60	70
chickens	/nz/	tʃɪkens	80	tʃiken	60	tʃɪkens	80	tʃiken	60	70

/Continued

TABLE 5 Narrative Token Coda Scores--Continued

INFORMANT	1		2		3		4	Mean		
WORD	Coda	Token	Score	Token	Score	Token	Score	Token	Score	Score
launched	/ntʃt/	lantʃt	100	lantʃ	60	lɔntʃ	60	lantʃ	60	70
belonged	/ŋd/	bɪlɔŋd	100	bilɒŋ	60	bilɔŋ	60	bilɒŋ	60	70
things	/ŋz/	θɪŋs	80	dɪŋ	60	θɪŋs	60	tɪŋʔ	70	68
act	/kt/	pɪkt	100	pɪk	60	pɪk	60	pɪʔ	42	66
used	/zd/	juzt	80	jusʔ	56	just	64	jusʔ	56	64
tells	/lz/	telʔ	70	tel	60	tel	60	tel	60	63
camped	/mpt/	kæmt	80	kæm	36	kæmpet	70	kæmp	60	62
results	/lts/	risʌls	60	risʌlʔ	42	risɑlts	100	risʌlʔ	42	61
lied	/aɪd/	laɪ	60	laɪ	60	laɪ	60	laɪ	60	60
lift	/ft/	lɪf	60	rɪf	60	lɪf	60	lɪf	60	60
seemed	/md/	sim	60	sim	60	sim	60	sim	60	60
seems	/mz/	sim	60	sim	60	sim	60	sim	60	60
and	/nd/	æn	60	en	60	æn	60	æn	60	60
against	/nst/	əgɛns	60	ʌkens	60	agens	60	ʌgens	60	60
adopt	/pt/	ʌdɔp	60	ʌdɔp	60	ʌdɔp	60	ʌdɔp	60	60
must	/st/	mʌs	60	mʌs	60	mʌs	60	mʌs	60	60
washed	/ʃt/	wɑʃ	60	waʃ	60	waʃ	60	waʃ	60	60
birds	/dz/	bɜˈs	48	bɜˈd	60	bɜˈd	60	bɜˈd	60	57
linked	/ŋkt/	lɪŋt	80	lɪŋdɛt	56	lɪŋtet	56	lɪŋ	36	57
called	/ld/	kalt	80	kɔt	48	kɔl	60	kɔˈ	36	56
gives	/vz/	gɪvs	80	gif	48	gɪf	48	kif	48	56
deaths	/θs/	dɛss	80	det	42	deθ	60	det	42	56
jobs	/bz/	tʃʌps	64	tʃɒp	48	dʒɒps	64	tʃɒʔ	42	55
risks	/sks/	rɪsk	60	rɪs	42	rɪss	70	rɪs	42	54
watched	/tʃt/	wɑst	70	watʃ	60	waʃɛs	42	waʃ	42	54
eggs	/gz/	eks	64	eks	64	eʔ	42	eʔ	42	53
fixed	/kst/	fɪks	60	fɪks	60	fɪks	60	fɪʔ	30	53
dragged	/gd/	drækt	64	træk	48	drækə	56	dræʔ	42	53
described	/aɪbd/	deskraɪb	60	dɪskraɪp	48	diskraɪpdə	64	dɪskraɪ	36	52
moved	/vd/	muft	64	muf	48	muf	48	muf	48	52
managed	/dʒd/	manetʃt	64	mæneʃ	42	mæneʃ	42	mæneʃ	42	48
changed	/ndʒd/	tʃent	48	tʃens	42	tʃentʃet	56	ʃen	36	46
helped	/lpt/	helʔ	42	helʔ	42	help	60	hel	36	45
asked	/skt/	ask	60	æs	36	as	36	aks	42	44
besides	/aɪdz/	bisaɪs	48	bisaɪt	48	bɪsaɪ	36	bɪsaɪ	36	42
films	/lmz/	fims	48	fɜˈms	48	fim	36	flim	30	41
solved	/lvd/	sɒft	42	sɒvt	48	sɒf	30	sɒf	30	38
solves	/lvz/	sɒfs	42	sɒf	30	sɒfs	42	sɒf	30	36
Grand Mean			71.6		55.4		63		53.8	61

The wordlists displayed 3 perfectly pronounced codas: /ts/, /ns/, and /ks/, and the narratives had one: /ns/. The mean wordlist score for all codas was 68.1, and the mean narrative score was 61. Only 6 codas experienced higher accuracy in the narrative. The mean score for all token codas was 64.6---about equivalent to the score for two voicing substitutions. Coda score differences between the wordlist and narrative, while averaging about 7, ranged from 0 for the /ns/ and /θs/ codas to 28 for the /lpt/ coda. Other highly divergent codas were /kt/ (24) and /ks/ (26). Correlation between the wordlist and narrative scores was 0.82. Only two of the top codas had identical rankings for both the narrative and wordlist (/ns/ (1^{st}), /ts/ (2^{nd})), while the bottom 6 codas agreed in rank between the two tasks: /lvz/, /lvd/, /lmz/, /skt/, /ndʒd/, and /dʒd/.

4.4.1 Phonemic /s/, /t/, /z/, and /d/ Endings

Codas ending in /s/ had the four highest scores in both wordlist and narrative: /ts/, /ns/, /ps/, and /ŋks/. The /s/ codas had a mean score of 82 in the wordlist and 76 in the narrative. Codas ending in /t/ had the next highest mean scores: 69 in the wordlist, but only 58 in the narrative—probably partly because of connected speech elisions. The /z/ codas had a mean wordlist score of 65 and a mean narrative score of 59, while the /d/ codas had a mean wordlist score of 61 and a mean narrative score of 54. Voiceless codas had a mean score of 70 points, voiced codas an average of 61 points; **-s** inflections had an average of 69 points, and **–ed** inflections 61 points in the wordlist. Using the mean of the two tasks, the accuracy hierarchy was /s/ (score = 79) > /t/ (score = 64) > /z/ (score = 62) > /d/ (score =58), or from voiceless to voiced (9 point difference) and then from **–s** inflections to **–ed** inflections (8 point difference).

The three pairs (/gz/, /gd/), (/lvz/, /lvd/), and (/aɪdz/, /aɪbd/) were the only violations of the /s/ > /t/ and /z/ > /d/ accuracy score ranking among individual codas. The following 15 pair orders were found, which conformed to the rule: /ŋks/ > /ŋkt/, /ks/ > /kt/, /ps/ > /pt/, /aɪz/ > /aɪd/, /ɔɪz/ > /ɔɪd/, /fs/ > /ft/, /aʊz/ > /aʊd/, /nz/ > /nd/, /ŋz/ > /ŋd/, /mz/ > /md/, /lz/ > /ld/, /mps/ > /mpt/, /bz/ > /bd/, /vz/ > /vd/, and /sks/ > /skt/.

As noted, /aɪbd/ was more accurately pronounced than /aɪdz/. This may have been due to the latter coda occurring right after the first coda in the narrative: "The costs of the Bird flu can't be described. Besides the…" There may have been an element of fatigue set in after one difficult diphthong coda had already been uttered. Neither coda was evaluated in the wordlist, but such an evaluation might well show opposite results.

As Table 6 on the following page shows, Mean narrative-wordlist scores ranged from 100 for the /ns/ coda to 37 for the /lvz/ coda. Mean scores for /s/ codas arising from plural nouns and from third person singular verbs were identical (68 points), which would indicate that the relative order in which these two morphemes are acquired (MAO) does not appear to affect the relative accuracy of the complex codas they form—at least when spoken by fluent learners.

Other observations on mean wordlist-narrative scores are found in the following sections.

TABLE 6 ALPHABETICAL MEAN TOKEN CODA SCORES

(With Frequency of Occurrence and –S Morphemes)

WORD	CODA	FREQUENCY	PLURAL	THIRD PERSON	MEAN
		Per 100,000	NOUNS	SINGULAR	SCORE
lied/tried	/aɪd/	85			65
Tries	/aɪz/	6		X	70
Described	/aɪbd/	--			52
besides	/aɪdz/	--			42
allowed/crowd	/aʊd/	15			70
cows	/aʊz/	6	X		73
enjoyed	/ɔɪd/	18			74
boys	/ɔɪz/	12	X		78
rubbed	/bd/	30			54
jobs	/bz/	30	X		60
birds/needs	/dz/	70			57
judged/managed	/dʒd/	60			50
beliefs	/fs/	10	X		75
laughed/lift	/ft/	80			62
dragged	/gd/	8			56
eggs/pigs	/gz/	20	X		53
makes	/ks/	190		X	87
fixed	/kst/	15			63
act	/kt/	290			78
called	/ld/	310			61
tells	/lz/	190		X	66
films	/lmz/	5	X		44
helped	/lpt/	9			59
belts/results	/lts/	23	X		62
solved	/lvd/	26			39
solves	/lvz/	37		X	37
seemed	/md/	80			67
seems	/mz/	310		X	70
lamps	/mps/	10	X		65
camped	/mpt/	20			57
and/rained	/nd/	3,170			63
once/sense	/ns/	300			100
chickens/means	/nz/	450	X		73
against/sensed	/nst/	50			67
changed	/ndʒd/	20			48
launched/pinched	/ntʃt/	7			75

/Continued

TABLE 5 –Alphabetical Token Coda Scores Continued					
WORD	CODA	FREQUENCY Per 100,000	PLURAL NOUNS	3rdPERSON SINGULAR	MEAN SCORE
belonged	/ŋd/	6			69
sings/things	/ŋz/	120	X		72
thinks	/ŋks/	33		X	90
linked	/ŋkt/	8			63
lips/steps	/ps/	120	X		87
adopt/hoped	/pt/	70			67
risks/tasks	/sks/	10	X		57
asked	/skt/	40			46
must/passed	/st/	890			70
washed/wished	/ʃt/	50			57
cats	/ts/	510	X		95
reached/watched	/tʃt/	40			64
deaths	/θs/	20	X		56
moved/saved	/vd/	120			54
gives	/vz/	110		X	59
used	/zd/	140			62
Mean Narrative/Wordlist			68	68	64

4.4.2 Number of Phonemes in Codas and Frequency of Use

What was perhaps most surprising, in view of the predictions of the MDH, was that certain voiceless tripleton codas (/ŋks/, /ntʃt/) had higher mean scores than their doubleton kin (/ŋz/, /tʃt/), as well as higher than those of many frequently used doubleton codas: /nd/, /st/, /nz/, /mz/, /ld/, /lz/, etc. The most commonly used English complex coda (/nd/), which accounts for 31.7 uses in 1,000 words, fell squarely in the middle of the accuracy distribution at 63 points. Five tripleton codas had scores which were equal to our higher than /nd/ besides the aforementioned /ŋks/ and /ntʃt/ (which occur 0.33 and 0.07 times per 1,000 words): /mps/ (0.1), /nst/ (0.5), /ŋkt/ (0.8), /kst/

(0.15), and /lpt/ (0.09). This would indicate that the phonemic considerations of voicing status and **–ed** or **–s** category vastly outweighed familiarity through exposure and frequency of use as predictors of pronunciation accuracy.

4.4.3 Influence of Loanwords and Commonly Used Words

Familiarity through exposure and frequency of use might have worked against accurate pronunciations in some cases. *Films* (or at least its singular, *film*) and *lift* qualify as English loanwords in Thai, as they are commonly transliterated, and *lift* actually is the most frequent Thai word for the British *lift* and American *elevator*. But its loanword status did not help pronunciation; the /ft/ coda achieved a mean score of 62, and the /t/ in *lift* was always deleted in the narrative—as its Thai transliteration, (ลิฟต์) [lɪf] would indicate. Compare the much less frequently used /fs/ coda with a higher mean score of 75. It is possible that Thai transliterations of loanwords that are taken to be the oral standard may influence how they are pronounced even by bilingual Thai learners. Similarly, the common native speaker reduction of *and* /ænd/ to [æn], [ən], and even [n̩] [13] probably ensured that the /d/ would not be pronounced in the narrative, because fluent Thai learners may also imitate their NS interlocutors.

4.4.4 Marked Features in Codas

Marked features (section 2.2.2) surely played a role in coda difficulty; codas containing /θ/, /dʒ/, /z/, /v/, and postvocalic /l/ were much harder than codas containing /p/, /t/, /k/, /m/, /n/, /ŋ/, and /s/. Generally the expected ranking of marked phonemes (/ð/, /θ/, /dʒ/, /ʒ/, /z/, /v/, /tʃ/, /ʃ/) predicted by the MDH applied. For

doubleton /s/ codas, /θs/ was by far the hardest; for /t/ codas, /ʃt/ was the hardest. Second hardest was /tʃt/, as all other /t/ doubletons did not involve marked phonemes. For /z/ codas, /gz/ (53), /dz/ (57), /vz/ (59), and /bz/ (60) were harder than /nz/ (73), /ŋz/ (72), and /mz/ (70)/, indicating that stops were harder than nasals in first position. For /d/ doubletons the most difficult codas: /dʒd/ (50), /vd/ (54), /bd/ (54), /gd/ (56) also scored an average of about 15 points lower than their nasal counterparts: /ŋd/ (69), /md/ (67) and /nd/ (63). Postvocalic /l/ was in the middle, between the difficult stops and easier nasals: /lz/ (66) and /ld/ (61). The introduction of post-vocalic /l/ to a doubleton coda always reduced the score: /lts/ vs. /ts/ (33 points); /lpt/ vs. /pt/ (8); /lvd/ vs. /vd/ (15); /lvz/ vs. /vz/ (22). However, /l/ was not unique in this respect, as /mps/ vs. /ps/ (28), and /mpt/ vs. /pt/ (10) show. This would indicate that quantity of difficult phonemes mattered more than quality.

4.4.5 Scoring Parameters: Doubletons vs. Tripletons

The last point perhaps begs the question of whether the scoring scheme was unfair to tripleton codas over doubletons, in that more could go wrong in the former, as three phonemes are being evaluated. This is a valid question, which might be explored in a few examples.

"Deaths" /deθs/ underwent mainly feature substitution to [dets] (70 points), or feature substitution and deletion to [det] (42 points). Curiously, the favored native speaker simplification (Celce-Murcia, et. al. 1996), favored because it retains the plural status-- to [dess], was utilized only once in eight tokens. Here there are two

scores of 70 and 42, with a midpoint score of 56, which was the actual mean wordlist/narrative score.

"Asked" /æskt/ underwent four different modifications: 1) deletion of /t/ to [æsk] (60 points); 2) deletion of /k/ and /t/ to [æs] (36 points); 3) deletion of /t/ and metathesis of /sk/ to [æks] (42 points); and 4) deletion of /k/ and paragoge [æstɛʔ] (49 points). Again, the simplification most commonly used by native speakers, namely, the deletion of medial /k/ to [æst], which retains the **–ed** inflection, was not employed, except partially in the example with paragoge. The mean of these examples is 47 points; the mean score was actually 46.

"Changed" /tʃeɪndʒd/ underwent six different modifications: 1) devoicing of /dʒ/ and /d/ [tʃentʃt] (64 points), 2) deletion of /d/ and devoicing of /dʒ/ [tʃentʃ] (48 points), 3) deletion of /dʒ/ and devoicing of /d/ [tʃent] (48 points), 4) deletion of /d/ and substitution of /s/ for /dʒ [tʃens] (42 points); 5) deletion of both /dʒ/ and /d/ [tʃen] (36 points); 6) devoicing of both /dʒ/ and /d/ with epenthesis to [tʃentʃet] (56 points). The mean of these five options is 49 points, and the mean wordlist/narrative score was actually 48.

"Solved" /sɑlvd/ had four different modifications: 1) deletion of /l/ and devoicing of /d/ [sɒvt] (48 points); 2) deletion of /l/ and devoicing of /d/ and /v/ [sɒft] (42 points); 3) deletion of both /l/ and /d/ and devoicing of /v/ [sɒf] (30 points); 4) deletion of /l/, devoicing of /v/, and schwa paragoge [sɒfdə] (40 points). The mean of these four options is 40 points, and the mean wordlist/narrative score was actually 39.

In 6 out of 8 tokens *solved* had three coda consonants in which errors occurred. In fact, in the whole complex coda corpus evaluated in this study, only *solved* and

solves had all three coda consonants simultaneously altered, which mostly explains why they had the lowest scores. But a comparison with *films*, *changed* and *asked* shows that the scores were not radically different (37 and 39 vs. 44, 46, and 48). In any event, the tactic (Section 3.5.2.4) of multiplying the scores together and then rounding up the result tends to minimize the effects on scoring of a coda which has three errors instead of two.

These examples also show that the number of possible alterations rose with the number of coda consonants involved; doubleton codas usually had just two or three different outcomes, while tripletons usually had four or five. There were some exceptions: *tells* was pronounced as [tels], [teos], [tel], and [telʔ], and the /dʒd/ coda had six different representations. But in general, a higher number of alternatives for a coda was correlated with a lower score; the correlation between mean wordlist/narrative scores and the number of representations for the codas was -0.41.

4.4.6 Diphthong Scores

Codas involving a consonant following the diphthongs, /aɪ/, /aʊ/, and /ɔɪ/ were evaluated as complex codas because the Thai language usually analyses their phonetic near-equivalents (ไอ/ใอ, อาย; เอา, อาว; and ออย) as ([aj], [aaj]), ([aw], [aaw]), and [ɔɔj], respectively. Hence, a consonant is never allowed to follow these vowels, for that would create a complex coda[14]. The scores for the **–s** and **–ed** inflected diphthong codas was relatively high, indicating that they have been mastered for the most part by these four informants. The most common strategy was devoicing of the final consonant, e.g., /kaʊz/ to [kaʊs], rather than deletion of the final consonant, as might have been expected. There were small differences between the /d/ and /z/ codas; the

latter had slightly higher scores than the former, as they did for the entire coda corpus as a whole. The weakest coda was /aɪd/ (wordlist, 70; narrative, 60), and the strongest were /ɔɪz/ and /aɪz/ (wordlist, 80, narrative, 75). The same hierarchy found in the codas as a whole: /s/> /t/> /z/> /d/, would imply that, as far as diphthong codas are concerned, that "nice" would be easier to pronounce than "night", which in turn would be easier than "size", which would still be easier than "side". This would contradict Contrastive Analysis if the vowel diphthongs were analyzed as the English /aɪ/, /aʊ/, and /ɔɪ/, i.e., as ending in vowels. However, if their Thai equivalents were taken, e.g., /aj/, /aw/, and /ɔj/, the postvocalic /s/ → [t] rule may not apply. The MDH would probably predict a score ranking of /t/ > /s/ > /d/ > /z/. In any event, voiceless diphthong codas were not evaluated, and the sample size of voiced diphthong codas was too small to form a definite conclusion on difficulty ranking.

Two inflected diphthong complex codas, /aɪbd/ and /aɪdz/, were included in the narrative sample to determine the prevailing repair strategy of the four informants. Would they change the vowel, /aɪ/, e.g., to /æ/, and retain the consonants, or would they retain the diphthong and modify or delete the consonants? The short answer is the latter. There were two additional deletions apiece to the /aɪbd/ and /aɪdz/ codas over and above those made to the /bd/ and /dz/ codas by the same speakers. But there were no alterations made to the diphthong vowel.

4.4.7 Feature Permutations

In an evaluation of the pronunciation of 6 different doubleton feature permutations of Thai learners reading a wordlist, Mano-Im, R. (1999) had found the following order from easiest to most difficult. Nasal-stop /nt/, Nasal-Fricative /ns/, Lateral-stop /lt/, Nasal-Affricate /ntʃ/, Stop-Fricative /ks/, and Stop-stop /kt/. The only Nasal-Stop codas evaluated in the present study were all voiced (/nd/, /ŋd/, /md/) and all had moderate scores (63, 69, 67). However, Mano-Im chose instead the voiceless /nt/ coda as the representative Nasal-Stop coda, but this coda was not evaluated in the present study, as it does not result from **–ed** inflections in modern English. Her second highest Nasal-Fricative permutation (coda= /ns/) was the present study's highest individual coda. With her third highest Lateral-Fricative permutation (coda = /lt/) again, only the voiced /ld/ was evaluated in the present study, and it had a moderate score of 61. The Nasal-Affricate permutation was not evaluated in the present study, but the Nasal-Affricate-stop (/ntʃt/, /ndʒd/) was, with a strong score (75) for the voiceless coda, and a weak score (48) for the voiced. Mano-Im's next to weakest Stop-Fricative permutation (coda = /ks/) actually had the fourth highest mean score (87) in the present study, while her weakest Stop-stop permutation was variable in the present study: strong on voiceless /kt/ (78) and weak on voiced /bd/ (54) and /gd/ (56). The widely differing accuracy results within single permutations led the evaluator to revised feature permutation categories, which are explained in Chapter V.

The main conclusion that can be drawn regarding feature permutations is that nasal consonants are easiest in postvocalic position. Postvocalic stops are moderately hard in voiceless codas, but hardest in voiced codas. Postvocalic laterals are harder than nasals and stops in voiceless codas, but intermediate in difficulty in voiced codas.

4.4.8 Other Strategies and Anomalies

There was no apparent difference in mean accuracy between /s/ and /z/ codas arising from plural nouns and those arising from third-person present tense singular verbs (Table 5, page 94). Given the large number of coda tokens tested (20 per informant task, or 160, total), this might indicate that the relative times of acquisition of these two different morphemes (which have identical phonological affixes) does not influence the accuracy of their respective codas in fluent learners. However, a definitive test would sample both (not just one) forms of the same 20 codas, e.g., *legs* and *begs* for /gz/ (**-s**) to verify that there were not significant accuracy differences between the plural noun and the third-person singular verb forms of the same codas.

The wordlist presented several near twin codas which differed by a single phoneme: "seems/seemed", "thinks/things", "watched/washed", "solved/solves", and "camped/camps" to clearly establish relative accuracy and speaker strategies. While the "solved/solves" pair was consistently difficult, the other pairs followed the /s/> /t/> /z/> /d/ ranking noted earlier. "Washed" (mean score = 57) was harder than "watched" (mean score = 64), as /ʃ/ does not exist in Thai phonology, while /tʃ/ does.

Remarkably, /ʃt/ was the hardest voiceless doubleton after /θs/, achieving a mere 57 points mean score. The final /t/ was deleted in 7 out of 8 cases, and in the eighth, there was erroneous voicing (of /t/) and paragoge. Surprisingly, the problem phoneme itself, /ʃ/ was usually retained. There were two cases of transposition, i.e., /ʃt/ → [tʃ]. Sometimes substitution to /s/ or to the affricate /tʃ/ was employed, but this did not prevent the /t/ from being deleted, even though the /st/ and /tʃt/ codas themselves were relatively unscathed, the latter having only one wordlist /t/ deletion. Oddly, this one deletion in /tʃt/ also substituted /ʃ/ for /tʃ/, implying that the /ʃ/

phoneme may not be the problem as much as the /ʃt/ combination. There is probably also confusion on the part of the speakers; as with the /v/→/w/ equivalence, they have been taught that /tʃ/ is equivalent to /ʃ/ by their teachers and their dictionaries. So they may switch back and forth; there were 3 /tʃ/→[ʃ] and 2 /ʃ/→ [tʃ] substitutions in the total tokens, showing that /ʃ/ was actually favored over the existing Thai phoneme, /tʃ/ in one additional case.

One conundrum of the coda scores is how the mean accuracy score for /ntʃt/ could be greater than that of /tʃt/, which in turn was higher than /ʃt/; the respective wordlist mean scores were 80, 73, and 54. The MDH would predict that /ntʃt/ would have the lowest score. The same pattern was not evident with the voiced counterparts; /ndʒd/ did not have a higher score than /dʒd/, and /ʒd/ was not tested, in any event. Perhaps the case of /tʃt/ being easier than /ʃt/ and /ntʃt/ easier still for these Thai informants is analogous to the medial consonant intrusion which naturally occurs in certain English tripleton and quadrupleton codas; /ms/, /mt/, /mst/ and /mθ/ tend to have medial /p/ inserted. This assimilative process actually means that the more complex coda is the easier; it is easier to say "camps", "dreamt", "glimpsed", or "warmth" with medial /p/ than without. Alternatively, CA might predict that allophonic processes would cause postvocalic /ʃt/ and /tʃt/ to be realized as [t], but these would not apply to /ntʃt/, as the nasal bears the brunt of being in postvocalic position. However, /ʃ/ is not a Thai phoneme, and so presumably would not be subject to allophonic processes as would /tʃ/. Moreover, the outlier was /ʃt/, not /tʃt/. Thai

learners' consistent problems with the /ʃ/ fricative, despite the presence in Thai of a close equivalent of the affricate, /tʃt/, ought to be investigated.

4.5 Overall Intelligibility in Pronunciation

After completing their assessments of the informant narrative and wordlist renditions, both auditors arrived at final assessments of overall intelligibility, using as a guideline the Speech/Intelligibility/Communicability Index (Appendix F). This rubric has six possible scores for intelligibility, and the evaluator instructed the auditor-assistants to evaluate the informants to any degree of fineness they were comfortable with. They both chose to grade down to the quarter-point. The evaluator also requested the assistants to just evaluate pronunciation, but, as their comments show, vocabulary and grammar were also important to the auditors: the first as a function of communicability and language development, the latter as it related to the pronunciation of the past and present perfect tense verbs, which had grammatical inflections.

Though the individual informant scores usually differed, the relative ranking of the informants was in agreement between the two auditors; that is, they both rated informant #1 highest, informant #3 a close second, then informant #2, with informant #4 last. Both auditors perceived that the difference between Informants 1 and 3 was less than the difference between informants 3 and 2. Respective comments on the speech of the informants reflected their scores. The commentary and numerical results relating to these assessments were as shown in Figure 2 below.

FIGURE 2: AUDITORS' COMMENTARY AND SCORING

	Auditor 1	Aud.1	Auditor 2	Aud.2
Informant	Comments	Score	Comments	Score
#1	"Better division of sounds; distinct individual words. The most 'Thai' accent"?	5.0	"Decent grammar, good verb tense, good, decent pronunciation".	5.0
#2	"Similar tendencies to informant #4; longer sequences (chunks) in which meaning is hard to decipher".	4.25	"More errors than informant #1. Fairly fast and fluent, though not very articulate".	4.0
#3	"More slurred, though perhaps more developed vocabulary than informant #1. Appears highly fluent. Is this a function of (good) accent 'distraction'? Less 'Thai' accent than the others.	4.75	"Consistent problems reading –ed codas in the narrative and wordlist; otherwise is highly fluent and idiomatic in the use of native-speaker like intonation".	4.75
#4	"More slurring, run-on segments in which sense is easily lost; much difficulty from pronounced (Chinese?) accent.	4.0	"Accent is so heavy that much is lost; distracts from the overall meaning. Words are spat out and clipped off".	3.5

As related in Sections 4.1.1 and 4.2, the faster the narratives were read, the greater the number of deletions and glottal stop substitutions occurred, and hence, the lower the scores for the informant. Neither auditor felt that the more rapid speech of informant #4 was advantageous, or led to a more bilingual NS effect. Even informant # 3's obviously fluent and idiomatic, as well as faster, speech did not make her score superior to that of informant #1, because separation between words was less evident. Intonation in her narrative was exaggerated and occasionally inappropriate, though this

may indicate an individuality or boldness in overcoming the flat intonation characteristic of most Thai learners, and a willingness to experiment. Informant # 2 was deemed a fluent speaker with a fairly limited vocabulary and a somewhat faulty delivery—many mistakes and repeats were noted in the narrative, though this did not detract from intelligibility to the same degree as with informant #4.

4.5.1 Overall Intelligibility Related to Informant History

Informant histories, as related in Table 1 can perhaps shed some light on respective speaking styles and overall intelligibility. Informant #1 had the least amount of formal instruction (M1-M6) in English, though unlike the others, she had the opportunity to spend 1 year as an exchange student, living with a native-speaking family in the U.S.A. Upon her return to Thailand, she finished her secondary schooling at a Thai school, unlike the other 3 informants, who all attended international schools. This might account for her slower, more careful speech. She has recently attended AUA and the British Council for two years to build upon the skills she acquired as an exchange student, and like informant 3, is a third year student (Junior) in the English College at Payap University. Informant 3 did not reside in a native-speaking country, but in Singapore, where English is the official language, though spoken by different L1 populations (Chinese, Indian, Malaysian). This might account for why her accent was perceived as the least 'Thai', and why she uses strategies uncharacteristic of Thai speakers (epenthesis, paragoge, intonation). Her facility with and exposure to English really date from her two years at Grace International School and her attendance at Payap, where she has established many acquaintances and friendships with NS and bilingual NNS. She uses English extensively (both in and out of the classroom) during every school day. Informants 2 and 4 are enrolled in the International College as first

year students, but like informant 1 are majoring in Business, and not as informant 3, in English Communication. Informant 2 has some NS and non-Thai NNS acquaintances, though not as many as informant 1 and 3. Despite her residence in New Zealand for 3 years, informant 4 probably has the fewest interactions with NS of any of the informants, and is studying in English mostly on account of her father, who will employ her upon graduation in his company. Her oral delivery is quick, assured, but fairly careless; she has probably communicated more with NNS than NS interlocutors. Her three years spent in New Zealand schools has also benefited her listening skills, as her answers to the interview questions were prompt and clear, if not clearly enunciated.

The motivations of informants 1 and 3 appear to be more intrinsic than those of informants 2 and 4. The former have already developed social relationships and perhaps more multifarious goals in how they intend to use English, and this may well mainly be a function of their length of stay at the International College (3 years); that is, informants 1 and 3 may have developed a more intrinsic desire to learn English through the relationships they have developed over time.

4.5.2 Informant Scores, Standard Deviation, and Correlations

Each informant was evaluated on 50 wordlist and 50 narrative tokens, or a total of 100 tokens. Informant #1 had the highest mean scores: wordlist, 74.8; narrative, 71.6. She was followed by informant #3, wordlist, 71.8; narrative, 63; informant #2, wordlist, 62.1, narrative, 55.4; and lastly, informant #4, wordlist, 62.9, narrative, 53.8. Informants 2 and 4 had mean wordlist/narrative scores which were within 1 point of each other, and so essentially tied for third place. Wordlist-narrative differences in mean scores were thus, informant 1, 3.2 points; informant 2, 6.7

points; informant 3, 8.8 points, and informant 4, 9.1 points. Hence, informant 1 was the most consistent speaker. Although informant 3 manifested perhaps greater fluency and use of intonation, she was not very consistent in her epenthesis strategies, as previously pointed out. As section 4.1.2 noted, the less proficient speakers #2 and 4 perhaps rushed the narratives. The mean wordlist score for all informants was 68.1, the narrative mean was 61, and the overall mean score was 64.5. Standard deviations among the informants ranged from 16 to 18 points, and the standard deviation for tokens as a whole was about 17.4. There were 52 perfect tokens and 99 tokens with scores below 50. The typical error was either a single deletion (60 pts.) or two voicing substitutions (64 pts.)

The standard deviation of scores within individual codas ranged from 0 to 25, with an average of 12 points. Codas with high variability, e.g., /ks/ and /kt/, were usually pronounced very well in the wordlist but suffered deletions in the narrative. Codas with low variability, e.g., /ɔɪz/ or /ndʒd/ usually either had pronunciations that were consistently good (the former), or consistently weak (the latter). Although the narratives suffered more deletions, particularly when connected speech patterns or uninflected codas were encountered, some wordlist tokens had actual 'mistakes': informant 1's "camped", pronounced, [ʃæm]; informant #2's "solves", pronounced, "[slouf]; and informant #4's "allowed", pronounced, [ʌlaʊf]. The latter two mispronunciations have been remarked upon in sections 3.5.1.3 and 3.5.1.4. Three obvious mistakes in 200 wordlist tokens (or 1.5%) show that the informants were well equipped to read the test codas.

4.5.3 Informant Codas and Intelligibility Scores

Using the numerical intelligibility/comprehensibility scores in Figure 2, informant 1 had a mean score of 5.0, informant 2 had 4.13, informant 3 had 4.75, and informant 4, 3.75. The respective mean narrative token scores were: 71.6, 55.4, 63, and 53.8; and the respective wordlist scores were 74.8, 62.1, 71.8, and 62.9. The Pearson correlation between the narrative mean scores and the intelligibility scores was 0.949, $p = 0.051$. Correlation and significance with the wordlist scores were nearly identical, i.e., 0.947 with $p = 0.053$. Correlation between mean overall wordlist/narrative scores and intelligibility scores was 0.958, $p = 0.042$, but results were not significant. With a sample size of only four informants, it could hardly be otherwise. But the strong correlation coefficient is encouraging, and would warrant a retest using a larger population. The correlation between informant usage of glottal stop substitutions in the narrative (Appendix H) and informant intelligibility was minus 0.929, with. $p = 0.07$. Correlation between deleted final consonants in narrative codas (Appendix G) and informant intelligibility was minus 0.87, with $p = 0.13$. Correlation between the total of final consonant deletions plus glottal stop substitutions and informant intelligibility was 0.95, with $p=0.0497$. This indicates that the deletion of the grammatical morphemes **–ed** and **–s** and their substitution by glottal stops was an impediment to achieving intelligible outcomes. Thus, while the auditors in their narrative transcriptions generally understood what the informants were saying, they likely factored the deleted inflections and glottal stop substitutions into their overall assessments.

The scoring method has been vindicated by the strong correlation with the auditors' assessments of intelligibility/comprehensibility. Despite individual deviances in coda production, the informants generally adhered to the same ranking in both coda

and overall pronunciation accuracy. Thus, the ranking for wordlist coda accuracy was (1,3,4,2); for narrative coda accuracy was (1,3,2,4); and for overall intelligibility was (1,3,2,4). The one mismatch in ranking was very close, as pointed out in section 4.5.2.

There was also very strong correlation between the two auditors' numerical assessments of the informants: the Pearson correlation was 0.994, which was highly significant: p=0.0055. In view of the fact that the two auditors never collaborated, or even met each other on this project, such a strong correlation indicates that inter rater reliability was good. Cronbach's Alpha was 0.956.

4.6 Summary

Final consonant deletions were much more prevalent (78%) than first (11%) or medial consonant (11%) deletions. Connected speech elisions accounted for a relatively small portion (12) of the excess of narrative over wordlist deletions (54). Instead, final consonants were deleted whether they appeared before words beginning with plosives, other consonants, or even vowels. The more proficient informants had fewer final consonant deletions and correspondingly more voicing substitutions of the final consonant (/d/ or /z/). The most proficient informant even retained the grammatical inflections at the expense of some medial or first consonants—as is often practiced by native speakers. Less proficient speakers read the narratives more quickly and tended to delete the final consonant or substitute with the glottal stop /ʔ/--as is also practiced by less proficient, or at least more regional NS. Most informants utilized vowel addition or metathesis only on the most challenging complex codas. A group hierarchy of coda scores was evident: /s/, /t/, /z/, to /d/, and voiced codas were harder than voiceless. No discernable difference in mean scores was apparent when

comparing /s/ and /z/ codas resulting from plural nouns with /s/ and /z/ codas resulting from third person singular verbs, which may indicate that their relative order of acquisition may no longer matter with fluent learners, such as the informants in this study. Some voiceless tripleton codas had a higher accuracy score than most voiced doubleton codas, though doubleton codas in general scored higher—as the MDH would predict. Loanword status did not help coda production; neither were extremely common words, such as "and" or "must" helped by their frequency. The anticipated markedness ranking of /ð/, /θ/, /dʒ/, /ʒ/, /z/, /v/, /tʃ/, and /ʃ/ generally held, though the last consonant was more troublesome than expected, indeed, was harder (before /t/) than either the affricate /tʃ/ or the pair /ntʃ/, and this may be partly due to the lack of allophonic processes in Thai for both /n/ and /t/ with these two codas. The pair /ʃ/ and /tʃ/ are often conflated by Thai learners. Difficult complex codas generally underwent a broader range of production than easier codas. Diphthong simple codas were well pronounced, usually only suffering voicing substitution of the coda. Diphthong complex codas underwent slight additional deletion of the final consonant, but no alterations to the vowel /aɪ/. Feature permutation scores varied both by voicing (voiced were harder) and by first consonant (nasals were easiest, voiced stops were hardest). Feature permutations and the /s/, /t/, /z/, /d/ accuracy hierarchy are investigated in more detail with a different group of informants in Chapter 5.