**Children’s speech acquisition**

Sharynne McLeod, Ph.D., Charles Sturt University, Australia (smcleod@csu.edu.au)

This compilation of data on typical speech development for English speaking children is designed to be used by speech-language pathologists. It is organised according to children’s ages to reflect a typical developmental sequence. However, it should be noted that rates of development vary among typically developing children. Where possible, data from more than one study is presented under each heading at each age to allow for comparison and to encourage consideration of diversity and individuality.

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<th>Authors</th>
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<th>Country</th>
<th>No. of children</th>
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**GLOSSARY.**

**Acquired sounds:** The age at which a certain percentage (often 75%) of children have acquired a phoneme in initial, medial and final position in single words.

**Phonetic inventory:** Repertoire of sounds a child can produce, regardless of the adult target.

**Syllable shape:** Structure of a syllable within a word. C = consonant; V = vowel.

The interaction between infants and their caregivers lays so many foundations for later learning” (McLaughlin, 1998, p. 192)

**Oral Mechanism**

Infant cf. adults

Oral space is smaller. Lower jaw smaller and retracted. Sucking pads are present, teeth emerge. Tongue large compared to size of oral cavity and therefore has more restricted movement. (Moves with jaw) Nose breather. Epiglottis and soft palate are in approximation as a protective mechanism. Newborns breathe/swallow at same time. Larynx is higher in newborn Eustachian tube lies in horizontal position. (More vertical in adults)

**Perception**

“By at least 2 days of age, the neonate has an ability to discriminate language specific acoustic distinctions…The 12 month old human has developed the capacity to categorise only those phonemes which are in its native language” (Ruben, 1997, p. 203)

**Crying**

Mean amount of crying /24 hours

1-3 months = 90 mins, mostly in the evening
4-6 months = 64.7 mins, mostly afternoon
7-9 months = 60.5 mins, afternoon/evening
10-12 months = 86.4 mins, mostly evening
Other studies show decrease at 10+ months

(McGlaughlin & Grayson, 2003)

**Vocalisation**

0-6 weeks = reflexive vocalisations: cry, fuss
6-16 weeks = coo and laughter: vowel-like
16-30 weeks = syllable-like vocalisations

(Stark, Bernstein, & Demorest, 1983)

0-0;2 = phonation, quasivowels & glottals
0;2-0;3 = primitive articulation stage: goong
0;4-0;5= expansion stage: full vowels, raspberries, marginal babbling

(Oller, Elers, Neal & Schwartz, 1999)

**Babbling**

“Late onset of canonical babbling may be a predictor of disorders… [ie.] smaller production vocabularies at 18, 24 & 36 months”

(Oller, Elers, Neal & Schwartz, 1999, p. 223)

31-50 weeks = reduplicated babbling: series of consonant and vowel-like elements

(Mitchell, 1997; Stark, 1979)

0;6+ = canonical stage: well-formed canonical syllables, reduplicated sequences e.g., [babababa]

(Ooller et al., 1999)

“The sounds babbled most frequently are produced more accurately by English-learning 2-year-olds, and appear more often in the languages of the world, than other sounds.”


**Phonetic Inventory**

**Consonants**

Nasal, plosive, fricative, approximant, labial, lingual

(Grumwell, 1981)

1;0 = Mean 4.4 consonants; median 4; range 0-16 (Tofare-Ecen et al., 2007)

1;0 = /m, d, b, n/ most frequently reported consonants in inventory

(Tofare-Ecen et al., 2007)

0;8 = 5 consonants in initial position (typically / d, t, k, m, h/); 3 consonants in final position (typically /t, m, h/)

0;9 = 5 consonants in initial position (typically /d, m, n, h, w/); 2 consonants in final position (typically /m, h/)

0;10 = 6 consonants in initial position (typically /h, d, t, m, n, h/); 4 consonants in final position (typically t, m, h, s/)

0;11 = 4 consonants in initial position (typically /d, m, n, h/); 2 consonants in final position (typically /m, h/)

1;0 = 5 consonants in initial position (typically /d, b, g, m, h/); 2 consonants in final position (typically /m, h/)(Robb & Biele, 1994)

**Vowels**

“Low, non-rounded vowels are favoured in the first year. Front-back vowel differences appear later than height differences”

(Loeke, 2002)

**Phonological Processes**

Present

All phonological processes (Grunwell, 1987)

**Syllable Structure**

Primarily mono-syllabic utterances

(Bauman-Waengler, 2000, p. 99)

**Prosody**

0;10 – 1;0 = Begin with falling contour only. Flat or level contour, usually accompanied by variations such as falsettos or variations in duration of loudness (Marcos, 1987 adapted by Bauman-Waengler, 2000)
**1;0 – 2;0 years**

“...from 18 to 24 months...the largest growth within the phonological system takes place...also...the child’s expressive vocabulary has at least tripled” (Bauman-Waengler, 2000, p. 107)

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### ORAL MECHANISM

Deciduous teeth continue to emerge

### INTELLIGIBILITY

2;0 = 26-50% intelligible  
(Weiss, 1982)

### ACQUIRED SOUNDS

#### Consonants (females)

2;0 = /m, n, h, g/  
(Chirlian & Sharpley, 1982)

#### Consonants (males)

2;0 = /m, n/  
(Chirlian & Sharpley, 1982)

#### Consonants (all children)

2;0 = /h, w/  
(Paynter & Petty, 1974)

2;0 = /m, n, ð, h, p/  
(Prather, Hedrick, & Kem, 1975)

Consonant clusters

?  
Vowels

?  

### PERCENT CORRECT

#### Consonants

2;0 = 69.2 (range 53-91)  
(Watson & Scukanec, 1997b)

#### Consonant clusters

?  

#### Vowels (USA -nonrhotic)

1;6-1;11 = 82% (range = 69-96)  
(Pollack & Berni, 2003)

### COMMON MISMATCHES

Consonants

?  
Consonant clusters

?  

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### PHONOLOGICAL PROCESSES

**Present**

Final consonant deletion, cluster reduction, fronting of velars, stopping, gliding, context sensitive voicing  
(Grunwell, 1987)

**Declining**

Reduplication, consonant harmony  
(Grunwell, 1987)

### PHONETIC INVENTORY

“First words show individual variation in consonants used; phonetic variability in pronunciations”  
(Grunwell, 1987)

#### Consonants

/m, p, b, w, n, t, d/  
(Grunwell, 1987)

1;0 = 5 consonants in initial position (typically /b, d, g, m, h/); 2 consonants in final position (typically /m, h/)

1;6 = 6 consonants in initial position (typically /b, d, m, n, h, w/); 3 consonants in final position (typically /t, h, s/)

2;0 = 10 consonants in initial position (typically /b, d, p, t, k, m, n, h, s, w/); 4 consonants in final position (typically /t, k, n, s/)  
(Robb & Bleile, 1994)

1;0 – Mean = 4.4 consonants; median = 4; range 0-16

1;0 – /m, d, b, n/ most frequently reported consonants in inventory  
(Ttofari-Eecen et al., 2007)

#### Vowels (USA)

1;3 = /i, u, æ, a'/

1;6 = /i, u, æ, ø, a, e'/

1;9 = /i, æ, u, ø, a, ð, æ/  
(Prather, Hedrick, & Kem, 1975)

2;0 = /i, ð, u, æ, o, ñ, a, æ'/  
(Prather, Hedrick, & Kem, 1975)

### SYLLABLE STRUCTURE

?  

### PROSODY

Young children acquire skills that control intonation earlier than final syllable timing skills (Snow, 1994).

1;1 – 1;3 = Rising contour. High falling contour that begins with a high pitch and drops to a lower one prior to 1;6 = high rising and high rising-falling contour around 1;6 = falling-rising contour. Rising-falling contour (Marcos, 1987 adapted by Bauman-Waengler, 2000)

### METALINGUISTIC SKILLS

1;6-2;0 = monitor own utterances: repair spontaneously, adjust speech to different listeners, practice sounds, words, sentences (Clark, adapted by Owens, 1996, p. 386)
ORAL MECHANISM

During first 3 years of life:

Maximum phonation time
2;6 – 2;11 = 6.55/sec (Robbins & Klee, 1987)

ACQUIRED SOUNDS
Consonants (males)

Per cent correct
Consonants (females)

Consonant clusters

COMMON MISMATCHES

PHONOLOGICAL PROCESSES

Present
Cluster reduction, fronting of velars, fronting /f/, stopping /v, ð, tʃ, dʒ/, gliding, context sensitive voicing (Grunwell, 1987)
Most prevalent = cluster reduction & liquid deviations (gliding) (Preisser et al., 1988)
2.0 = final consonant deletion, liquid simplification, later stopping, cluster reduction, vowelsalisation
3.0 = later stopping, cluster simplification (Watson & Scukanec, 1997b)
2.7-3.0 = 23% fronting  
(Lowe, Knutson & Monson, 1985)

Declining
Final consonant deletion  
(Grunwell, 1987)
Affrication, palatalization, nasalization, prevocalic voicing, vowel changes  
(James, 2001)

PHONETIC INVENTORY

Consonants (word-initial)
9-10 consonants  
(Stoel-Gammon, 1987)
2.0 = /p, b, t, d, k, m, n, s, f, h, w, j/  
2.3 = /p, b, t, d, k, g, m, n, s, f, h, w, j, v/  
2.6 = /p, b, t, d, k, g, m, n, s, f, h, tʃ, w, j, l/  
2.9 = /p, b, t, d, k, g, m, n, s, f, h, tʃ, w, j, l/  
3.0 = /p, b, t, d, k, g, m, n, s, f, h, tʃ, ð, w, j, l/  
(Watson & Scukanec, 1997b)
/m, p, b, w, n, t, d, (g), (k), (j), v/  
(Grunwell, 1987)
2.0, 2.5, 2.9 = /p, b, t, d, k, g, f, s, h, m, n, w, j, l/  
(Dyson, 1988)

Consonants (word-final)
5-6 final consonants  
(Stoel-Gammon, 1987)
2.0 = /p, t, k, m, n, s, z/  
2.3 = /p, t, d, k, s, z/  
2.6, 2.9, 3.0 = /p, t, d, k, m, n, s, z, l, n/  
(Watson & Scukanec, 1997b)
2.0 = /p, t, d, k, tʃ, ?, f, s, j, m, n/  
2.5 = /p, t, d, k, tʃ, ?, f, s, j, m, n, r, æ/  
2.9 = /p, t, k, ?, f, s, j, m, n, æ/  
(Dyson, 1988)

Consonant clusters
“A few clusters”  
(Stoel-Gammon, 1987)

2.6 = /pw, bw, -n, -n/,  
2.9 = /pw, bw, bl, -n, -s, -nt, -nt/,  
3.0 = /st, sp, pl, -n, -ts, -nt, -nt, -st, -ntʃ/  
(Watson & Scukanec, 1997b)
2.0 = /fw, -ts (ntʃ)/  
2.5 = /hw, (bw), -ts, (-ps), (ntʃ), (ʃk)/  
2.9 = /hw, (kw), (-ps), (-ts), (-nts), (-ʃk)/  
(Dyson, 1988)

Common word-initial clusters contained nasals (e.g., [-nd, -nt, -ʃk]).

2.0 = predominantly word-final consonant clusters containing w/ (e.g., [bw, kw])
3.0 = range of word-final clusters predominantly containing l/, /w/ or /s/.

SYLLABLE STRUCTURE

Syllable shapes
CV, CVC, CV.CV, CV.CVC  
(Stoel-Gammon, 1987)
CV, VC, CVC, 2-syllable  
(Shriberg, 1993)

Monosyllabic words - V, CV, VC, CVC, CCVC, CCVCC, CCCCCVC  
(Dodd, 1995)

Polysyllabic words - V, CV, VC, CVC, CCVC  
(Watson & Scukanec, 1997)

PROSODY

“Significantly greater number of stress errors in SWS words (S = strong; W = weak). Tendency for greater number of stress errors in SWSW words. Stress errors were more frequent in imitated than spontaneous productions.” (Kehoe, 1997)

“An analysis of children’s truncation error syllable deletion patterns revealed the following robust findings:
(a) Stressed and word-final un-stressed syllables are preserved more frequently than nonfinal unstressed syllables,
(b) word-internal unstressed syllables with obstruent onsets are preserved more frequently than word-internal syllables with sonorant onsets,
(c) unstressed syllables with non-reduced vowels are preserved more frequently than unstressed syllables with reduced vowels,
(d) right-sided stressed syllables are preserved more frequently than left-sided stressed syllables.

An analysis of children’s stress patterns revealed that children made greater numbers of stress errors in target words with irregular stress.” (Kehoe, 2001, p. 284)

METALINGUISTIC SKILLS

1.5-2.0 = monitor own utterances: repair spontaneously, adjust speech to different listeners, practice sounds, words, sentences  
(Clark, adapted by Owens, 1996, p. 386)
A client 3 years of age or older who is unintelligible is a candidate for treatment (Bernthal & Bankson, 1998, p. 272)

Consonants (all children)

3;6 = + / b, t, d, k, g, m, n, ng, h, f, w /
3;6 = + / v /
4;0 = + / s, z, ts, dz, l /

(Att & Goodban, 1976)

3;0 = /m, n, ng, h, p, j, d, k, f, w, b, t, g, s /
3;6 = + / f, j /
3;0 = + / f, j /
4;0 = + / d, z, z' (Prather, Hedrick, & Kern, 1975)

3;0 = / p, t, d, k, g, m, n, ng, f, v, s, z, h, w, l, j /
3;6 = + / f, j /
4;0 = + / g, dz /

(Dodd et al., 2003)

Consonant clusters

3;6 (males & females)= /tw, kw/ (Smit, et al., 1990)
4;0 (males) = /tw, kw, pl, bl, kl/ (Templin, 1957)
4;0 (females) = /tw, kw, pl, bl, kl, gl, pr, tr, tr, kr, gr/ (Templin, 1957)
4;0 = /kw/ (Anthony et al., 1971)

Common mismatches

3;0-3;5 = 79.2% (range = 4-100)
3;6-3;11 = 76.5% (range = 4-100)

Consonants (>15%)

rj → r; r → w; v → b; θ → f; θ → d; s → dentalised

Consonant clusters (>15%) pr → pw; br → bw; tr → tw; dr → dw; kr → kw;
gr → gw; tr → tw; 0r → fr; st → st; skw → 0kw; spl → 0pl; spw → 0pr; swp;
str → 0tr; stw; skr → 0kr; skw

Phonological processes

Present

Stopping /v, θ, θ', /f, j, dz/, gliding,

Declining

Cluster reduction

Backing, cluster reduction, deaffrication, final consonant deletion, final devoicing, initial consonant deletion, labial assimilation, palatalisation, stopping, unassisted syllable deletion, fricative simplification (James, 2001)

Phonetic inventory

Consonants

/ip, b, t, d, k, g, f, s, h, m, n, l, r, final = /p, t, d, k, g, m, n, l, r; initial = /p, b, t, d, k, g, f, s, h, m, n, l, r; int/ (Dyson, 1988)

Consonant clusters

3;0-3;11 = 97.3% (range = 89-100)
3;6-3;11 = 97.2% (range = 91-100)

Pollock, 2002; Pollock & Berni, 2003

Vowels (USA - rhotic)

3;0-3;5 = 79.2% (range = 4-100)
3;6-3;11 = 76.5% (range = 4-100)

Vowels (USA - nonrhotic)

3;0-3;5 = 97.3% (range = 89-100)
3;6-3;11 = 97.2% (range = 91-100)

Pollock, 2002; Pollock & Berni, 2003
Consonant clusters

3.3 = /-ts, (fw), (tr), (sp), (st), (sn), (sl), (bw), (-ps), (-ns), (-nt), (-nk)/ (Dyson, 1988)

Obstruent + approximant used, /s/ clusters may occur (Grunwell, 1987)

3.0 = range of word-initial clusters predominantly containing /l/, /w/ or /s/.

Common word-final clusters contained nasals (e.g., [-nd, -nt, -nk]).

(McLeod, van Doorn & Reed, 2001b)

Vowels

N.Zealand /i, e, o, d, t, e, æ, ø, a, ɒ, u/ USA /i, e, o, d, t, e, æ, ø, a, ɒ, u, æ, ø/

(Robb & Gillon, 2007)

SYLLABLE STRUCTURE

CV, VC, CVC, Cn_ or _Cn, 2-syllable (Shriberg, 1993)

Average number of syllables/words
3.0 = 1.26
4.0 = 1.27 (Flipsen, 2006a)

PROSODY

Speaking rate
New Zealand = 182 syllables per minute; 7.15 phones per second
USA = 208 syllables per minute; 8.17 phones per second (Robb & Gillon, 2007)

Stress

“...after 2 years of age, deletion of stressed syllables is relatively infrequent, and after 3 years of age, deletion of unstressed syllables is less frequent” (Kehoe, 2001,291)

PHONOLOGICAL AWARENESS

Emerging skills (Dodd & Gillon, 2001)

“The majority of 4-year-old children... will not exhibit phonological awareness other than syllable segmentation and the emergence of rhyme awareness” (Dodd & Gillon, 2001,142)
### Oral Mechanism

**DDK (4;0 – 4;5/4;6 – 4;11)**

| /p/ = 4.89/ 4.64 per second |
| /t, d/ = 4.77/ 4.46 per second |
| /k, g/ = 4.58/ 4.29 per second |

Patticake = 1.56/ 1.33 per second

(Robbins & Klee, 1987)

### Maximum Phonation Time

| i/ = 8.01/ 9.22 sec |

(Robbins & Klee, 1987)

### Phonetics

**Consonants (all children)**

4;6 = /t, l, d, n, r, g, m, w, v, s, z, j, f, v, s, t, k, g, s, l, r, | 4,6 = + /v, z, s/ |

| /r/ (Kilminster & Laird, 1978) |

### Consonants (males)

4;0 = /t, l, d, n, r, g, m, w, v, s, z, j, f, v, s, t, k, g, s, l, r, | 4,6 = + /v, z, s/ |

| /m, n, r, h, p, j, d, k, f, w, b, t, g, s, l, r, | 4,6 = + /v, z, s/ |

| /j, t, d, n, r, g, m, w, v, s, z, j, f, v, s, t, k, g, s, l, r, | 4,6 = + /v, z, s/ |

### Consonants (females)

5;0 = /t, l, d, n, r, g, m, w, v, s, z, j, f, v, s, t, k, g, s, l, r, | 4,6 = + /v, z, s/ |

| /m, n, r, h, p, j, d, k, f, w, b, t, g, s, l, r, | 4,6 = + /v, z, s/ |

### Consonant Clusters

**Consonant clusters (all children)**

5;0 = /t, l, d, n, r, g, m, w, v, s, z, j, f, v, s, t, k, g, s, l, r, | 4,6 = + /v, z, s/ |

| /j, t, d, n, r, g, m, w, v, s, z, j, f, v, s, t, k, g, s, l, r, | 4,6 = + /v, z, s/ |

### Vowels

**Vowels (Australian)**

4;0-4;11 = 95.2% in monosyllabic words

4;0-4;11 = 92.08% in polysyllabic words

(James van Doorn & McLeod, 2001)

### Vowels (USA - nonrhotic)

4;0-4;6 = 98% (range = 91-100)

4;6-11 = 99% (range = 94-100)

(Pollock, 2002; Pollock & Berni, 2003)

### Vowels (USA - rhotic)

4;0-4;5 = 90.1% (range = 37-100)

4;6-11 = 86.8% (0-100)

(Pollock, 2002)

### COMMON MISMATCHES

**Consonants (>15%)**

0–f, s → dentalised

(Smit, 1993a)

**Consonant clusters (>15%)**

pr → bw; br → tw; tr → dw; kr → kw; gr → gw; fr → lw; fn → fn; st → st; skw → Bkw; spl → Bpl; spw → Bpr; spw; str → Btr; skw → Bkr; skw (Smit, 1993b)

### Phonological Processes

**Present**

/l/ → [j], /r/ → [d, l], palatalisation of

| /j, t, d, s/ → /g, k, m, n, h, p, j, d, k, f, w, b, t, g, s, l, r, | 4,6 = + /v, z, s/ |

### Percent Correct

**Consonants**

4;0-4;11 = 83.97% in monosyllabic words

4;0-4;11 = 83.97% in polysyllabic words

4;0-4;11 = 82.45% in polysyllabic words

5;0 = same as for 4;6  (Smit, et al., 1990)

### ACQUIRED SOUNDS

**Consonants (females)**

4;0-4;11 = 83.97% in monosyllabic words

4;0-4;11 = 82.45% in polysyllabic words

4;0 = /p, b, t, d, n, r, g, m, w, v, s, z, j, f, v, s, t, k, g, s, l, r, | 4,6 = + /v, z, s/ |

### Percent Correct

5;0 = 98.93%  (Dodd et al., 2003)

### SYLLABLE STRUCTURE

**CV, VC, CVC, Cn, Cr, Cn, Cn, 2-syllable, 3-syllable**

(Shrobberg, 1993)

| Average number of syllables/words |

| 4,6 = 1.27; 5,0 = 1.29 |

(Flipsen, 2006a)
5;0 – 6;0 years

“By the time children enter school, their phonological development has progressed considerably” (Baum-Waengler, 2000, p. 118)

**ORAL MECHANICS**

DDK (5;0 – 5;5/ 5;6 – 5;11)

| /p, b, t, d, k, g, m, n, j, f, v, s, z, h, w, l, j, f, z, dз, ʃ/ |
| /d, ʒ, z, dз, ʃ/ |

5;0 = /p, b, t, d, k, g, m, n, j, f, v, s, z, h, w, l, j, f, z, dз, ʃ/ (Dodd et al., 2003)

**Consonant clusters (all children)**

5;0 = /tw, kw, sp, st, sk, sm, sn, pl, bl, kl, gl, fl, pr, br, tr, dr, kr, gr, fr, str/  
6;0 = /tw, kw, sp, st, sk, sm, sn, pl, bl, kl, gl, fl, pr, br, tr, dr, kr, gr, fr, skw, stw/ (Templin, 1957)

5;0 = /tw, kw, fl, tr, kr, br/ (Dodd et al., 2003)

5;0 = /tw, kw, sp, st, sn, bl, gl, dr/ (Smit, et al., 1990)

5;6 = /tw, kw, sp, st, sn, pl, bl, kl, gl, fl, fr, skw/ (Smit, 1993b)

5;0-5;11: 94.3% in monosyllabic words  
5;6-7;0: 99% (range = 98-100) (Dodd et al., 2003)

5;0-5;11 = 94.3% in monosyllabic words  
5;6-7;0 = 99.19% (Dodd et al., 2003)

**COMMON MISMATCHES**

Consonants (>15%)

Nil (Smit, 1993a)

Consonant clusters (>15%)

> 5;6 = pr–pw; br–bw; tr–tw; dr–dw; kr–kw; gr–gw; skw–8kw; spl–8pl, spw; spr–8pr; spw; str–8tr; stw; skr–8kr, skw

**PHONOLOGICAL PROCESSES**

Declining

Deaffrication, ephemerism, metathesis, fricative simplification (v/ð) (James, 2001)

5;0-5;11: Gliding (Dodd et al., 2003)

**SYLLABLE STRUCTURE**

CV, VC, CVC, Cv, _Cn, _Cv, 2 syllable, 3+ syllable (Shriberg, 1993)

Average number of syllables/words

5;0 = 1.29  
6;0 = 1.30 (Flipsen, 2006a)

**PHONETIC INVENTORY**

Consonants

/i, p, b, w, n, t, d, nj, k, g, h, v, ɬ, ð, w, s, z, ʃ, z, dз, l, j, ɬ, d, r/ (Afft & Goodban, 1976)

5;0-5;11 = 94.8% in monosyllabic words

5;0-5;11 = 94.3% in polysyllabic words (James van Doorn & McLeod, 2001)

**Vowels (USA -nonrhotic)**

5;0-5;11 = 99% (range = 98-100)  
5;6-7;0 = 99% (range = 98-100) (Pollock, 2002; Pollock & Berni, 2003)

**Vowels (USA - rhotic)**

5;0-5;11 = 88.2% (range = 0-100)  
5;6-7;0 = 80.31% (range = 0-100) (Pollock, 2002)

**PHONOLOGICAL AWARENESS**

“The ability to produce intonation functionally is largely established in five-year-olds though some specific functional contrasts are not mastered until C.A. 8.7” (Wells, Peppé & Goulandris, 2004, p. 749)

5;0 – 5;5 = syllable segmentation, rhyme awareness, alliteration awareness, phoneme isolation (+ letter knowledge, UK)  
5;6 – 5;11 = phoneme segmentation (Dodd & Gillon, 2001)
6;0+ years

"As time goes on, it becomes more difficult to clearly number the individual developments. Major changes may be less specific…”

(McLaughlin, 1998, p. 353)

ORAL MECHANISM
6 yrs = skull reaches adult size
6 yrs = permanent teeth emerge
7-10 yrs = lower face "growth spurt"
9-13 = tongue and lips "growth spurt"
Mandible + tongue + lips "grow" to allow growth until 16 yrs (girls) and 18 yrs (boys)

(Bauman-Waengler, 2000)

DDK (6;0 – 6;5/6;6 – 6;11)

oral phonation time
/l/ = 5.38l/5.51 sec /l/ = 5.32l/5.37/sec
/n/ = 4.94l/4.85/sec /patticake = 1.61/1.64

(Robbins & Klee, 1987)

Intelligibility

5;6-7;0 = 99.01% (197.07–100.00)
7;0 = 99.51% (97.36–100.00)

(Gordon-Brannan, 1994)

PHONETIC INVENTORY

Consonants (males)
6;0 = ALL = /m, n, h, w, p, b, t, d, k, g, f, s, j, v, ð, s, t, dz, l, z, r, j, ð, / (Smit et al., 1990)
6;0 = /m, h, g, p, r, q, w, t, d, k, j, f, b, m, j, t, s, l, z, r, v
7;6 = +/θ, δ'/

(Chirlian & Sharpley, 1982)

Consonants (females)
6;0 = ALL = /m, n, h, w, p, b, t, d, k, g, f, s, j, v, ð, s, t, dz, l, z, r, j, ð, / (Smit et al., 1990)
6;0 = /m, h, g, p, r, q, w, t, d, k, j, f, b, m, j, t, s, l, z, r, v
7;6 = +/θ, δ'/

(Chirlian & Sharpley, 1982)

Consonants clusters (all children)
6;0 = /hw, kw, sp, st, sk, sm, sn, pl, bl, kl, gl, fl, pr, br, tr, dr, kr, gr, fr, skw, str/
7;0 = /hw, kw, sp, st, sk, sm, sn, sw, sl, pl, bl, kl, gl, fl, pr, br, tr, dr, kr, gr, fr, skw, spl/...
8;0 = /hw, kw, sp, st, sk, sm, sn, sw, sl, pl, bl, kl, gl, fl, pr, br, tr, dr, kr, gr, fr, skw, spl, str, str, skw/ (Templin, 1957)

(Chirlian & Sharpley, 1982)

Consonants clusters (males)
6;0 = /hw, kw, sp, st, sk, sm, sn, sw, sl, pl, bl, kl, gl, fl, pr, br, tr, dr, kr, gr, fr, skw, spl/
7;0 = /hw, kw, sp, st, sk, sm, sn, sw, sl, pl, bl, kl, gl, fl, pr, br, tr, dr, kr, gr, fr, skw, skw/
8;0 = /hw, kw, sp, st, sk, sm, sn, sw, sl, pl, bl, kl, gl, fl, pr, br, tr, dr, kr, gr, fr, skw, spl, str, skw/ (Smit, et al., 1990)

Consonants clusters (females)
6;0 = /hw, kw, sp, st, sk, sm, sn, sw, sl, pl, bl, kl, gl, fl, pr, br, tr, dr, kr, gr, fr, skw, spl/
7;0 = /hw, kw, sp, st, sk, sm, sn, sw, sl, pl, bl, kl, gl, fl, pr, br, tr, dr, kr, gr, fr, skw, spl/
8;0 = /hw, kw, sp, st, sk, sm, sn, sw, sl, pl, bl, kl, gl, fl, pr, br, tr, dr, kr, gr, fr, skw, spl, str, str, skw/ (Smit, et al., 1990)

Consonant clusters (all children)
6;0 = /p, b, t, d, k, g, m, n, j, f, v, s, z, h, w, l, j, t, f, dz, s, n
7;6 = +/θ, δ'/

(Dodd et al., 2003)

Consonant clusters (males)
6;0 = /hw, kw, sp, st, sk, sm, sn, sw, sl, pl, bl, kl, gl, fl, pr, br, tr, dr, kr, gr, fr, skw, spl/
7;0 = /hw, kw, sp, st, sk, sm, sn, sw, sl, pl, bl, kl, gl, fl, pr, br, tr, dr, kr, gr, fr, skw, spl/
8;0 = /hw, kw, sp, st, sk, sm, sn, sw, sl, pl, bl, kl, gl, fl, pr, br, tr, dr, kr, gr, fr, skw, spl, str, str, skw/ (Smit, et al., 1990)

Consonant clusters (females)
6;0 = /hw, kw, sp, st, sk, sm, sn, sw, sl, pl, bl, kl, gl, fl, pr, br, tr, dr, kr, gr, fr, skw, spl/
7;0 = /hw, kw, sp, st, sk, sm, sn, sw, sl, pl, bl, kl, gl, fl, pr, br, tr, dr, kr, gr, fr, skw, spl/
8;0 = /hw, kw, sp, st, sk, sm, sn, sw, sl, pl, bl, kl, gl, fl, pr, br, tr, dr, kr, gr, fr, skw, spl, str, str, skw/ (Smit, et al., 1990)

Consonants (males)
6;0 = /m, p, b, t, d, k, g, m, n, j, f, v, s, z, h, w, l, j, t, f, dz, s, n
7;0-7;11 = 93.93% in monosyllabic words
6;0-6;11 = 90.76% in polysyllabic words

(Shriberg, 1993a)

Consonants (females)
6;0 = /m, p, b, t, d, k, g, m, n, j, f, v, s, z, h, w, l, j, t, f, dz, s, n
7;0-7;11 = 95.10% in monosyllabic words
6;0-6;11 = 90.44% in polysyllabic words

(Shriberg, 1993a)

Phonemes (USA - rhotic)

6;0-6;6 = 90.3% (range = 0-100)
6;6-6;10 = 77.2% (range = 2-100)

(Pollock, 2002)

COMMON MISMATCHES

Consonants (>15%)
Nil

(Smit, 1993a)

Consonant clusters (>15%)

tr→tw; skw→khw; spl→bpl; spr→bp;
spw; str→br; swk→brk; skw

(Smit, 1993b)

SYLLABLE STRUCTURE

All

(Shriberg, 1993)

Average number of syllables/words
6;0 = 1.30; 7.0 = 1.32; 8.0 = 1.33 (Flipsen, 2006a)

PHONETIC INVENTORY

Established skills (Australia)
6;0 – 6;5 = syllable segmentation, rhyme awareness, alliteration awareness, phoneme isolation
6;6 – 6;11 = phoneme segmentation

(Dodd & Gillon, 2001)

Established skills (UK)
6;0 – 6;5 = syllable segmentation, rhyme awareness, alliteration awareness, phoneme isolation, letter knowledge, phoneme segmentation

(Dodd & Gillon, 2001)

PROSODY

Intonation production continues to be mastered until 8;7. Intonation comprehension continues to develop up to 10;10 (Wells, Peppé & Goulandris, 2004)

PHONOLICAL AWARENESS

Established skills (Australia)
6;0 – 6;5 = syllable segmentation, rhyme awareness, alliteration awareness, phoneme isolation
6;6 – 6;11 = phoneme segmentation

(Dodd & Gillon, 2001)

Established skills (UK)
6;0 – 6;5 = syllable segmentation, rhyme awareness, alliteration awareness, phoneme isolation, letter knowledge, phoneme segmentation

(Dodd & Gillon, 2001)