

*Submitted version of Tessier (2010) review of Smith (2010).
Appeared in Lingua 121(2): 328-331.*

Review author's name and affiliation:

Anne-Michelle Tessier, University of Alberta

Book title:

Acquiring Phonology: A cross-generational case-study

Book author/ editor(s):

Neilson V. Smith

Publisher:

Cambridge University Press

Year of publication:

2010

Number of pages:

265

ISBN:

978-0-521-51587-0

Price:

£55.00

*Submitted version of Tessier (2010) review of Smith (2010).
Appeared in Lingua 121(2): 328-331.*

Neil Smith's first well-known book, *The acquisition of phonology*, was published in 1973 and it remains one of the most influential and most quoted studies in classical generative phonology, and probably the best-known case study of phonological acquisition ever written. It told the story of one child (Amahl)'s speech production in rigorous detail through a model example of explicit phonological analysis, with sets of rules for every stage and sub-stage identified. The main theoretical claims for which it became famous have informed most grammatical studies of phonological learning ever since: that a child's inability to produce contrasts or structures is not primarily driven by the failure to perceive them and that children's grammars are made up of the same stuff as adult grammars, so that their phonology maps adult-like underlying forms onto modified surface productions that are eventually brought closer and closer to the target through grammatical re-organization.

In subsequent years, the data in Smith (1973) has been fruitfully mined by a myriad of authors: sometimes using the highly detailed data provided to argue for a modification of its theoretical claims (see especially Macken 1980) and often exploring novel or alternative approaches to the wealth of Amahl's data (Dinnsen, O'Connor and Gierut 2001, Goad and Rose 2004, Jesney 2005, Spencer 1986 *inter alia*.) In some sense, the study ensured that the generative phonological research program would include acquisition data as a central source of evidence, and its lasting relevance demonstrates the great value of longitudinal studies and detailed lexical descriptions of children's speech.

In the 37 years since *The acquisition of phonology* was published, the field has changed in a few fundamental ways. Some changes come from the much larger range of data available, complemented by the technological breakthroughs that make large data sets easy to access, share and study – nevertheless, very few longitudinal studies comparable to Smith (1973) have been published (some notable contenders include Compton and Streeter 1977, as reported in Pater 1996; Fikkert 1994; Rose 2000; Adam 2002.) Another change is the theoretical shift from rule-based to constraint-based grammars, which has sometimes been credited with rejuvenating interest in capturing phonological development. It has also shifted some emphasis from the observation of actual children to the delineation of learnability problems and their solutions within the formal confines of Optimality Theory (Prince and Smolensky 1993/2004) and its cousins; nevertheless, some of the most persuasive arguments for constraint-based grammar have come from empirical studies of child phonology (Gnanadesikan 1995, Pater 1997).

From these perspectives, the time is perhaps ripe for a return to comprehensive longitudinal studies, combined with critical comparison of the theories intended to capture their data – and these are essentially the goals of Smith (2010), entitled *Acquiring phonology*. The book's empirical contribution is another detailed case study of (what else) the phonological development of Amahl's son Zachary (Z). Its second goal, given equal priority, is to re-examine the theoretical claims of Smith (1973) given the intervening works and Z's additional data, and eventually to put forward a rather different understanding of child speech than that of the 1973 study.

*Submitted version of Tessier (2010) review of Smith (2010).
Appeared in Lingua 121(2): 328-331.*

The book begins with a chapter of theoretical preliminaries, followed by a chapter that summarizes Smith (1973) with a certain degree of hindsight and a chapter discussing approaches to phonological theory since the mid 1970s: autosegmental theories, Principles and Parameters, Optimality Theory, and the various research strands subsumed under the term ‘usage-based approaches’. In these theory chapters, two themes are given particular consideration: first, whether children’s non-target pronunciations are the result of differences in competence or in performance; second, what mental levels of representation children are using and accessing when they speak. Chapter Four then provides what feels like the meat of the book: fifty pages documenting Z’s phonological system, complemented by the final two chapters of lexical and data appendices. Chapter Five concludes the prose with the author’s conclusions, based on his son and grandson’s developmental data combined, about the nature of phonological acquisition.

The case study itself contains data from a total of 154 transcription sessions collapsed into 13 stages, spanning Z’s speech from ages seven months to four years. These sessions consisted of notes taken in phonetic transcription and were supplemented by tape-recordings, ‘used to corroborate the details of particular pronunciations’ (50), although the extent to which these recordings were used and their level of spectrographic detail are not provided. It is implied that the 13 analyzed ‘stages’ were chosen impressionistically according to more or less substantial changes in Z’s phonology; while some more objective divisions might have been preferable, the diachronic lexicon of chapter 6 (though arranged by lexical item not by session) does allow a patient reader to assess the cohesion of each ‘stage’ item by item.

With these caveats, the thirteen stages are described in considerable detail. Each begins with a description of Z’s general cognitive and more specific communicative development followed by the stage’s broad phonological properties: an inventory of segments in different syllabic positions, and where applicable their ‘contrastiveness’ (e.g. whether Z controls voicing in stops, or the extents to which his vowel targets are reliable or systematic); the syllabic inventory in different prosodic contexts as well; and extensive commentary on Z’s receptive lexicon, inferred perceptual abilities, and metalinguistic awareness. Starting with stage 4, non-target rules of Z’s phonology are provided in a modified SPE format, and each rule’s trajectory is tracked as it enters the grammar, grows or shrinks in scope, and eventually disappears.

As an example: at stage 4 (ages 2;2-2;3) Z deleted unstressed syllables in some lexical items but not others, and page 61 provides a whole paragraph detailing how the prosodic shape of the target did not appear to predict whether truncation occurred. Given this unpredictability, unstressed syllable truncation is formalized in a rule R1 ‘only [because] the development at stage 6 ... indicates that it merits explicit formalisation’ (61). By stage 6 (roughly 2;4-2;5.15), Z’s application of R1 has acquired some phonological context: he no longer truncates word-final unstressed syllables (except for some variants of *orange*), whereas word-initial unstressed syllables are deleted or retained in ‘roughly equal’ numbers of words. Truncation still remains tied to lexical items: *together* consistently retains its initial syllable while *tomato* does not, and *tomorrow* is produced with both two

*Submitted version of Tessier (2010) review of Smith (2010).
Appeared in Lingua 121(2): 328-331.*

and three syllables within the same session (74). There is also a revealing dialogue between Z and his mother on his awareness of this truncation pattern:

- 1) [Mother]: 'Look, there's a cement mixer'
Z: ['mɛnt midə]
[Mother]: What does Mummy call it?
Z: [si'mɛnt midə] (74)

Alongside such robust documentation, however, there are some notable lacunae of detail and analysis. With respect to the third context for R1 at stage 6, the prose provides the six target words whose word-medial unstressed syllables were deleted, but without any indication of what proportion of attempted targets those six represent. With respect to word-initial context, there is no hint given of segmental predictability for deletion vs. preservation, but some tendencies suggest themselves in the words provided: for example, three out of the four words produced with initial schwa retained it (*away, again, another*, but not *eleven*), whereas two out of the seven words with an initial obstruent retained that syllable (*together* and *Glenferrie*, whose first syllable was pronounced [dɛn], but not *cement, computer, professor, tomato* and *tomorrow*.)

These varied methods for empirical analysis are similarly applied throughout the data chapter: phonological rules are interspersed with prose discussion of the many targets they did or did not apply to, supplemented variously by observations by the author or Z himself about Z's speech compared to that of the adults around him. Readers who are looking for tables of transcribed examples or proportions of tokens repaired by natural class will be frustrated; readers who are e.g. browsing for anecdotal confirmation of patterns in another child's data may find the approach refreshing.

In its general development Z's English phonology seems to have been fairly unexceptional, although it was rather slow to become intelligible due especially to some rampant neutralizations of velar and coronal contrasts. These intelligibility issues are raised at the beginning of the chapter, and are made especially clear by rules such as R7 at stage 8, which details 16 different non-faithful mappings for coronal consonants alone (86). From stages 4 to 13, the author identifies twelve rules with various sub-clauses (rather opaquely named R1 to R12) which for the most part describe common processes: velar fronting, coda deletion, voicing errors and the like, as well as e.g. a templatic use of intervocalic [j], (e.g. [di:jə] for *digger*), similar to that described in Priestly (1977). One of the less typical patterns concerns Z's acquisition of complex onsets, where he appears to have relied extensively on singleton onsets with secondary articulations – [tʳ], [pʳ], [bʳ], [fʳ] and so on – some of which are described as *contrasting* with true clusters like [tɹ] and [pɹ]. A set of related and very revealing onset cluster data come from Z's responses to a metalinguistic question game where he would answer what sound a word 'begins with' (these are compiled in chapter 7.4). These judgments are, as the author argues, suggestive of Z's representational beliefs about the onset constituent, and they also provide a methodology which might prove very helpful in larger studies of children's clusters and word-edges.

*Submitted version of Tessier (2010) review of Smith (2010).
Appeared in Lingua 121(2): 328-331.*

Framing this main data section are chapters 3 and 5, which describe various accounts of phonological acquisition and then argue towards a set of claims regarding its correct analysis. (A reader who wishes to cut to the chase can consult the comprehensive list of these claims on page 126). Those familiar with Smith (1973), and with recent discourse in the phonological acquisition literature, many find some of these results to be a surprise. The central conclusions are that though children's productions are 'rule-governed', they are in fact a matter of performance not competence; that rules rather than e.g. constraints are the best way of describing phonological patterns; but also that these descriptions are merely convenient notational devices (at least for children?), while true grammatical knowledge is mentally encoded within a 'neural network' of an unarticulated nature; and that children do not have any mental representation of their produced form, whether labeled as 'surface form' or 'output' or anything else. Several additional claims are made, with varying degrees of specificity or novelty – for example, agreeing with Macken (1980)'s challenge of Smith (1973) that some non-target productions are most reasonably analyzed as misperceptions.

Writing as a phonologist whose acquisition research has all been conducted within constraint-based grammar, my failure to be convinced by the book's objections to Optimality Theoretic-phonology (given in chapter 3.3) may likewise fail to convince readers of those arguments' flaws. As an example, one objection raised in the chapter stems from the claim that children have no representation of their own productions, meaning that their phonology cannot proceed by comparing inputs and outputs. One other notable issue concerns the well-known difficulty of deriving chain shifts in any grammar that does not include intermediate representations, including the 'classic' OT of Prince and Smolensky (1993/2004). The most famous chain shift from Smith (1973) is A's mapping from target *puzzle* to 'puddle' but from target *puddle* to 'puggle'. While the present work acknowledges some of the recent approaches to chain shifts within the OT framework (McCarthy 1999, Jesney 2005), it also claims that 'the best-known treatment of such chain shifts is Smolensky (1996)'s resolution of the perception-production asymmetry' (40). This statement is hard to leave unchallenged: while Smolensky (1996) refers to some of A's chain shifts, they only serve to provide one reason that children's non-target productions cannot be purely the result of articulatory difficulty (since A could articulate the string 'puddle' just fine, but only did so for target *puzzle*). With the exception of Hale and Reiss (2008: 66-67), no other understanding of Smolensky (1996)'s theory of perception exceeding production has taken it to also provide an account of opacity in OT. The arguments against 'usage-based' and exemplar accounts (chapter 3.4) also involve well-known concerns – e.g. how a learner that stores tokens rather than rules could generalize to novel contexts, or how a frequency-driven learner could create any observed 'anti-frequency' effects – but neither are they undiscussed in the relevant literature (particularly the former, on which see e.g. Pierrehumbert 2001.)

Whatever the reader's theoretical proclivities, the most controversial claims of the book may be that child production is fundamentally performance-driven, and that children have no output representations of their own. On the former point, the reader familiar with work by Hale and Reiss (1998, 2008) will perhaps not find any substantially new arguments in this work. On the latter point, the study contains an impressive amount of up-front

Submitted version of Tessier (2010) review of Smith (2010).
Appeared in Lingua 121(2): 328-331.

counter-evidence, particularly chapter 7.3's index of Z's metalinguistic commentary on his own pronunciations. Examples of 'output monitoring' were also noted in Amahl's speech, as seen in the following exchange:

- 2) NS: Say 'jump'
A: [dʌp]
[...]
NS: 'No, 'jummmmp'
A: 'Only Daddy can say [dʌp]' (p. 115)

In response to such data, it is suggested (p. 116) that Z has access to the 'output of the body' rather than the 'output of the phonology' (quoting Hale and Reiss 2008), meaning that children may discuss the properties of their speech production via phonetic echoes in a mental buffer without giving these echoes grammatical status.

In the final sections of both chapters 3 and 5, the study concludes that whatever grammatical knowledge children do possess about phonology should be understood in the terms of a neural network – though chapter 4 retains the traditional phonological rules to describe Z's speech in featural detail. These sections do, however, admit that many questions remain open. For example: "A final issue is whether a neural network has any coherent counterpart to the kind of rule simplification discussed in [Smith 1973] (e.g. p. 155) and can replicate the effects of rule ordering. In neither case am I competent to judge though I suspect that the answer is yes in both cases.' (48-49). Readers who are better-equipped to answer such questions about the theories being compared here will also be able to determine for themselves how seriously to take this study's theoretical conclusions.

This book is a valuable contribution to the set of longitudinal case studies on English L1 phonological acquisition. The diachronic lexicon of chapter 6 is a fairly uncommon and particularly helpful resource, and it combines with the prose analyses of chapter 4 to provide data fodder for a myriad of empirical questions about synchronic stages of child speech production as well as lexical development. The book's chapter 2 also provides a good primer on Smith (1973)'s theory and results from a more modern perspective, and it is quick and clear in pointing out weakness and later empirical developments. In a similar spirit, I look forward to new proposals and analyses of phonological acquisition that build on this study's new data.

Submitted version of Tessier (2010) review of Smith (2010).
Appeared in Lingua 121(2): 328-331.

References

- Adam, Galit (2002). *From Variable to Optimal Grammar: Evidence from Language Acquisition and Language Change*. Ph.D. dissertation, Tel- Aviv University.
- Compton, A.J. and M. Streeter (1977). *Child Phonology: Data Collection and Preliminary Analyses. Papers and Reports on Child Language Development 7*. Stanford, CA: Stanford University.
- Dinnsen, Daniel A., Kathleen M. O'Connor & Judith A. Gierut. 2001. The puzzle-puddle-pickle problem and the Duke-of-York gambit in acquisition. *Journal of Linguistics* 37: 503-525.
- Fikkert, Paula. (1994) *On the Acquisition of Prosodic Structure*. Ph.D. dissertation, University of Leiden.
- Gnanadesikan, Amahlia. (1995/2004) Markedness and faithfulness constraints in child phonology. In R. Kager, W. Zonneveld, J. Pater (eds.), *Fixing Priorities: Constraints in Phonological Acquisition*. Cambridge: Cambridge University Press.
- Goad, Heather and Yvan Rose. (2004). Input Elaboration, Head Faithfulness and Evidence for Representation in the Acquisition of Left-edge Clusters in West Germanic. In R. Kager, W. Zonneveld, J. Pater (eds.), *Fixing Priorities: Constraints in Phonological Acquisition*. Cambridge: Cambridge University Press, 109-157.
- Hale, Mark and Charles Reiss. (1998). Formal and empirical arguments concerning phonological acquisition. *Linguistic Inquiry* 29: 656-683.
- Hale, Mark and Charles Reiss (2008). *The Phonological Enterprise*. Oxford: Oxford University Press
- Jesney, Karen. (2005) *Chain shift in Phonological Acquisition*. M.A. thesis, University of Calgary. Available at: <http://people.umass.edu/kjesney/Jesney2005MA.pdf>
- Macken, Marlys A. (1980) The child's lexical representation: the 'puzzle-puddle- pickle' evidence. *Journal of Linguistics* 16: 1-17
- McCarthy, John J. (1999). Sympathy and Phonological Opacity. *Phonology* 16: 331-399.
- Pater, Joe (1997). Minimal Violation and Phonological Development. *Language Acquisition* 6: 201-253.
- Pierrehumbert, Janet (2001). Exemplar dynamics: Word frequency, lenition and contrast In J. Bybee and P. Hopper (eds.), *Frequency effects and the emergence of linguistic structure*. Amsterdam: John Benjamins.
- Priestly Tom M. S. (1977). "One idiosyncratic strategy in the acquisition of phonology." *Journal of Child Language*, 4, 45-66.
- Prince, Alan and Paul Smolensky (1993/2004). *Optimality Theory: Constraint interaction in generative grammar*, Oxford, Blackwell.
- Rose, Yvan. (2000) *Headedness and Prosodic Licensing in the L1 Acquisition of Phonology*. Ph.D. dissertation, McGill University.
- Smith, Neilson V. (1973). *The Acquisition of Phonology: A Case Study*. Cambridge, MA: Cambridge University Press.
- Smolensky, Paul (1996). "On the comprehension/production dilemma in child language," *Linguistic Inquiry* 27: 720-731.
- Spencer, A. (1986). Towards a theory of phonological development. *Lingua* 68. 3-38.