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BRIEF RESEARCH REPORT

The role of elicited verbal imitation in toddlers' word learning*

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ABSTRACT

This study is about the role of elicited verbal imitation in toddler word learning. Forty-eight toddlers were taught eight nonwords linked to referents. During training, they were asked to imitate the nonwords. Naming of the referents was tested at three intervals (one minute later [uncued], five minutes, and 1–7 days later [cued]) and recognition at the last two intervals. Receptive vocabulary, nonword repetition, and expressive phonology were assessed. The accuracy of elicited imitation during training predicted naming at one and five minutes, but not 1–7 days later. Neither nonword repetition nor expressive phonology was associated with naming over time but extant vocabulary predicted performance at all time intervals. We hypothesize that elicited

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imitation facilitates word learning in its earliest stages by supporting encoding of the word form into memory and allowing practice of the articulatory-phonological plan. At later stages, vocabulary facilitates integration of the word form into the lexical network.

INTRODUCTION

Toddlers are astute word learners. By the time they are two years old, they have added an average of 260 words to their lexicons (Reilly *et al*., 2009). In this paper, we examine the role of verbal imitation over time, including the initial moment when a child hears a new word, the first few minutes after exposure, then again days later. Greater insight into children's verbal imitation abilities over this early timecourse of word learning has relevance for understanding what skills contribute to the growth of children's lexicons. We begin with a definition of imitation, followed by an overview of what is known and remains to be understood about elicited verbal imitation and word learning. In doing so, we establish the need to better understand the role of elicited verbal imitation relative to other abilities known to contribute to word learning in toddlers.

Verbal imitation in children has been defined and measured in different ways, and examined in different contexts. Definitions have included elicited imitation of nonwords linked to novel referents (e.g. Stokes & Klee, 2009a); spontaneous imitation of real words and/or nonwords linked to novel referents (e.g. Leonard, Chapman, Rowan & Weiss, 1983; Masur & Eichorst, 2002); elicited imitation of real words (e.g. Chiat & Roy, 2007), and elicited imitation of nonwords (i.e. nonword repetition [NWR]) where there is no referent (e.g. Chiat & Roy, 2007; Stokes & Klee, 2009a). Measures of imitation have included a child's willingness to imitate as operationalized by frequency of imitation (e.g. Leonard *et al*., 1983; Masur, 1995) as well as the accuracy of imitation using measures such as whole items correct, syllables lost, and proportion of phonemes correct (e.g. Chiat & Roy, 2007; Stokes & Klee, 2009a). The contexts in which imitation has been examined include naturalistic play-based interactions (e.g. Leonard *et al*., 1983; Masur & Eichorst, 2002) as well as more formal, experimental tasks (e.g. Chiat & Roy, 2007; Masur, 1995; Stokes & Klee, 2009a).

Several researchers have found a relationship between elicited imitation and extant vocabulary. Roy and Chiat (2004) assessed verbal imitation abilities in children aged 2;0–4;0 using an early version of the Preschool Repetition Test (Seeff-Gabriel, Chiat & Roy, 2008) which consisted of real words and nonwords without referents. Using the number of whole items correct to assess accuracy, they found the accuracy of word and nonword repetition to be positively associated with receptive vocabulary size. This

finding was later confirmed by Chiat and Roy (2007) in both typically developing toddlers and those who had been referred for speech–language therapy services.

Stokes and Klee (2009a) also reported a relationship between elicited imitation accuracy and extant vocabulary. They assessed verbal imitation in toddlers aged 2;0–2;6 using the Test of Early Non-word Repetition (TENR; Stokes & Klee, 2009b). This test uses nonwords not linked to referents. They calculated the proportion of phonemes correct for each nonword and found that the accuracy of nonword imitation was positively correlated with a number of measures of existing vocabulary including the Macarthur Communicative Development Inventories (CDI; Fenson *et al*., 1993, with UK adaption by Klee & Harrison, 2001), and expressive and receptive standardized tests of vocabulary. Similar observations were reported by Hoff, Core, and Bridges (2008) based on parent-based measures of vocabulary in toddlers.

Whereas the relationship between imitation and extant vocabulary is well documented, less is known about the relationship between imitation and new word learning. What role does elicited imitation play during the moment when a child hears a new word and first begins to learn it? In Stokes and Klee's (2009a) study, there was an association between NWR performance and new word learning in toddlers. Their referents for the word learning experiment consisted of two known food props and four unusual shapes. The experimenter labelled the objects once and each was given to the participant with a prompt to imitate – "this is modi, can you say modi?" (Stokes & Klee, 2009a, p. 500). To probe production, the experimenter then held up the object and asked the child what it was, and to probe recognition the child was asked to select the named item from a group of six objects. The word learning task was administered twice on one day. The primary dependent variable was a composite word learning score which included accuracy of elicited imitation during training and two measures taken post-training: recognition of the nonword-to-referent links and naming accuracy. After controlling for age, they found imitation of nonwords (i.e. NWR without a referent) and the composite word learning score to be positively correlated ($r = .26$). However, because elicited imitation accuracy was bundled into the composite learning score, it is difficult to draw conclusions about the role of elicited imitation accuracy during toddlers' early word learning.

To unravel this issue, we re-examined data from Munro, Baker, McGregor, Docking, and Arciuli (2012). In that study, forty-eight typically developing toddlers aged 2;5–3;0 participated in a word learning task designed to train eight nonwords linked to referents over time. Each nonword and its novel referent were presented via a structured discovery game in either a sand or music play context. During training, toddlers

heard one of the nonwords six times and were then asked to imitate it (e.g. "you say bekemite"; Munro *et al*., 2012, p. 4). Their production of the target nonwords during referent naming was then tested 1 minute after they played with the object. This procedure was repeated for each nonword–referent pair. For each play context, children's recognition and naming of referents was then assessed 5 minutes after the training game then again 1–7 days later with no further training. Toddlers were also provided with a phonological cue upon error at two of the testing intervals (i.e. at 5 minutes and 1–7 days later). The cue consisted of the first syllable and a finger tapping gesture of the number of syllables contained in the target nonword. Naming accuracy increased when the children were provided with this cue. No relationship was found between performance on a NWR test and either recognition or naming accuracy at any of the testing intervals. What was not examined by Munro *et al*. (2012) was whether elicited imitation of the nonwords during training had a later impact on recognition or naming. Recall that the toddlers heard the target nonword six times during training and were then asked to imitate it. It is unknown whether the accuracy of elicited imitation of the nonwords correlated with their ability to recognize or name the referents linked to the nonwords at later testing intervals.

The role of imitation in the timecourse of word learning is worth investigating given that word learning indeed takes time and experience with a new word. Exposure is needed to encode a new word while time assists consolidation of the new word where fragile, novel memories are strengthened (see McGregor, 2014, for review). There are many facets to what contributes to successful encoding and consolidation of new words. In the current study, we explored the relative contributions of existing speech and language abilities in conjunction with elicited imitation of the trained nonwords on the children's naming and recognition performance of the target nonwords. We define imitation as elicited imitation of nonwords that are linked to referents in an experimental word learning context with calculation of the proportion of phonemes correct as the measure of a child's ability to imitate.

The main aim of this study was to determine whether the accuracy of elicited imitation of nonwords linked to referents during training influenced the subsequent naming or recognition of those referents, in typically developing toddlers' over time. We predicted that the accuracy of a child's elicited verbal imitation during training would predict the accuracy of nonword production during naming at all three time intervals. This prediction was based on research that has demonstrated a relationship between elicited verbal imitation and naming (Stokes & Klee, 2009a). We also predicted that there would be a relationship between elicited imitation of nonwords and later recognition of nonword-to-referent links, based on

previous literature pointing to an association between verbal imitation and existing receptive vocabulary knowledge (e.g. Roy & Chiat, 2004; Stokes & Klee, 2009a). However, this prediction was tentative given that research has not specifically examined verbal imitation of nonwords linked to referents during training and later recognition.

Second, we sought to examine the relative contributions of elicited verbal imitation accuracy and existing speech and vocabulary skills to word learning over time. Various abilities have been associated with toddlers' abilities to learn words. Specifically, measures of expressive vocabulary size have been associated with toddlers' phonological abilities (Smith, McGregor & DeMille, 2006). Toddlers' receptive vocabulary size has also been associated with measures of word learning (Munro *et al*., 2012). We predicted that multiple measures including elicited imitation accuracy of nonwords linked to referents, expressive phonology, and existing vocabulary would relate to measures of the toddlers' word learning performance.

Finally, given that we were interested in toddlers' verbal imitation abilities we also examined the relationship between two different measures of this ability, specifically elicited verbal imitation accuracy of nonwords linked to referents during training for a word learning task and verbal imitation accuracy in a NWR task. We expected to find a positive relationship between elicited verbal imitation of the nonwords linked to referents and NWR as it is assumed that both of these tasks tap the skill of imitation.

METHOD

The participants and methods are reported by Munro *et al*. (2012) and are outlined here only briefly. The University of Sydney Human Research Ethics Committee approved this research.

Participants and procedure

Participants were forty-eight children aged 2;5–3;0 (mean = 2;9, SD = 2·25 months). Participants were recruited via advertisements in community parenting magazines/newspapers. Parents reported normal birth, medical, and developmental history and hearing. All children had receptive vocabulary scores >16th percentile on the Peabody Picture Vocabulary Test–Fourth edition (PPVT-4; Dunn & Dunn, 2007; mean percentile = 84·67, SD = 13·81), and typical expressive phonology skills on the Goldman Fristoe Test of Articulation–Second edition (GFTA-2; Goldman & Fristoe, 2000; mean percentile = 76·48, SD = 13·89). The descriptives indicated that the sample recruited was positively skewed on both receptive vocabulary and expressive phonology measures. Mean years of maternal education was 16·73 (SD = 1·89, range: 11–19). The children's NWR skills were assessed

on the TENR (Stokes & Klee, 2009b). Training of the nonwords linked to novel referents and subsequent testing was conducted in the first session. One to seven days later (hereafter referred to as 'multiday'), the children returned for a second session which consisted of a single testing point.

Training procedure

Children participated in two 20-minute training episodes (music and sand). Eight referent toys were introduced one at a time alongside two toy foils (one unrelated novel object and one unrelated but highly familiar object). Each target nonword was presented six times in a prepared verbal script. For example, for the nonword *bekemite* (an unusual toy musical instrument), the script was: *I'm looking for a bekemite. This isn't it; it's a frog. Oh, this isn't it; it's a mak. Ah ha, here it is. This is a bekemite. This is a red and blue bekemite. You can rattle a bekemite. Let me show you. Bekemite! You say bekemite. It's your turn to play with it now* (Munro *et al*., 2012, p. 4). All the target nonwords contained early developing speech sounds and two or three syllables. Nonwords used are shown in Table 1.

Testing procedure and scoring

The elicited verbal imitation involved the examiner asking the child to imitate the nonword during the training script. No feedback about accuracy was given. Subsequent nonword-to-referent link recognition and referent naming were tested at the intervals shown in Table 1. Naming included uncued and cued naming at the 5-minute and multiday intervals as shown in Table 1. Recognition was scored as correct/incorrect selection of the referent from an array of four foils that were lexical or semantic neighbours. Naming was scored as proportion of phonemes correct (PPC) to the nonword target. For cued naming, the child's production of the first syllable was excluded from PPC calculations. PPC was used as it was sensitive to toddlers' naming performance. A measure such as whole words correct would have been too broad and resulted in close to floor performance.

RESULTS

Data analysis

Correlations were conducted first to examine whether any of the independent variables of interest, elicited verbal imitation, nonword repetition without a referent as measured by the TENR, extant vocabulary as measured by the PPVT-4, and expressive phonology as measured by the GFTA-2 were associated with the measures of word learning (the naming and recognition scores across the 1-minute, 5-minute (cued), and multiday (cued) test

TABLE 1. *Testing stimuli and procedure (as described in Munro* et al., *2012, p. 4)*

Stimuli	1-minute naming	5-minute recognition	5-minute (uncued) and (cued) naming	Multiday recognition	Multiday (uncued) and (cued) naming
/pʌki/ /nɔtə/ /mɪpʌ/ /næki/ /tɛgidɛə/ /baqədu/ /bɛkimaɪt/ /dʌtəbaɪ/	Child played with the novel referent for 1 minute. Examiner picked up toy and said: *That was fun wasn't it. What was this one called?* No feedback provided about production.	A four alternative forced-choice task (4AFC) used. Each referent presented alongside three foils (one familiar semantic neighbour, one familiar object that was a phonological neighbour, and one novel object that was named once during training).	**Uncued:** Examiner removed all toys except target and asked: *What's this called?* **Cued:** If uncued response incorrect/no response, a phonological cue was provided consisting of the first syllable of the nonword: *It's a /bɛ/...*	The 4AFC choice task was repeated.	**Uncued:** The same as at 5-minute (uncued) naming. **Cued:** The same as at 5-minute (cued) naming.

intervals). The uncued naming intervals at 5 minutes and multiday were not included in statistical analyses due to the close to floor performance on these tasks.

All children attempted to imitate the target nonwords during elicited imitation. At the later test intervals, some children did not attempt to name any of the target nonwords, and their data were excluded from analyses for that naming test interval, specifically; at 1-minute naming, one child did not make attempts, at 5 minutes (cued), three children did not make attempts, and at multiday (cued), six children did not make attempts.

Following the correlation analyses, a series of stepwise multiple regressions were conducted. In line with the procedures in Stokes and Klee (2009a), the results of the correlations were used to determine which independent variables would be included in the regressions.

Descriptive statistics

The descriptive statistics for each of the independent variables and the dependent variables of naming and recognition at the different test intervals are presented in Table 2.

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Correlation analyses

Partial correlations, controlling for age, were conducted. Children's elicited verbal imitation during training was positively associated with the accuracy of later naming at the 1-minute ($r = .45$, $p = .002$) and 5-minute (cued) test intervals ($r = .40$, $p = .008$), but not for multiday (cued) naming. Accuracy of elicited verbal imitation did not correlate with recognition performance at the 5-minute or multiday test intervals. There was a marginally significant positive correlation between elicited imitation and PPVT-4 receptive vocabulary ($r = .29$, $p = .052$). There was no relationship between accuracy of elicited verbal imitation of the trained nonwords and accuracy of nonword imitation without a referent as measured by the TENR.

We also explored relationships between extant vocabulary skills and naming accuracy, and between expressive phonology and naming accuracy. Extant vocabulary as measured by the PPVT-4 was positively correlated with naming accuracy at 1-minute ($r = .40$, $p = .008$), 5-minute (cued) ($r = .45$, $p = .003$), and multiday (cued) ($r = .57$, $p = < .001$) test intervals. Expressive phonology as measured by the GFTA-2 was not correlated with any measure. Several of the dependent measures significantly correlated with one another. Naming at 1 minute positively correlated with 5-minute (cued) naming ($r = .42$, $p = .005$), 5-minute (cued) naming positively correlated with multiday (cued) naming ($r = .54$, $p = < .001$), 5-minute recognition positively correlated with multiday naming ($r = .36$, $p = .018$) and with multiday recognition ($r = .43$, $p = .003$). Finally, multiday recognition and multiday (cued) naming were positively correlated with one another ($r = .32$, $p = .035$).

Regression analyses

As none of the independent variables were significantly associated with recognition at either of the timepoints, regressions were not conducted for recognition data. For naming data, separate regressions were run for 1-minute and 5-minute (cued) naming, and multiday (cued) naming.

For 1-minute naming, age, elicited imitation, and extant vocabulary were included as predictor variables in a stepwise regression. Age was excluded by the model because it was not a significant predictor, and the remaining model was significant ($F(2,44) = 9{\cdot}875$, $p = < .0001$). Elicited imitation and extant vocabulary together accounted for 31% of the variance in naming scores ($R^2 = .31$). The unique variance of each predictor was also calculated. Elicited imitation accounted for significant unique variance ($F(1,45) = 9{\cdot}787$, $p = .003$, $R^2 = .18$), as did extant vocabulary ($F(1,45) = 7{\cdot}902$, $p = .007$, $R^2 = .15$). For 5-minute (cued) naming, age, elicited imitation, and extant vocabulary were entered as predictors. The model again excluded age. The model was significant ($F(2,42) = 10{\cdot}546$, $p = < .0001$).

TABLE 2. *Descriptive statistics for independent (elicited imitation, TENR, PPVT-4, and GFTA-2) and dependent (1-minute naming, 5-minute naming (cued), multiday naming (cued), 5-minute and multiday recognition) variables*

Assessment	*N*	*M (SD)*
Elicited imitation (PPC)	48	.84 (0·24)
TENR (PPC)	46	.81 (0·07)
PPVT-4 (raw scores)	48	58 (12·97)
GFTA-2 (PPC)	47	.86 (0·06)
1-minute naming (PPC)	47	.29 (0·26)
5-minute (cued) naming (PPC)*	43	.28 (0·18)
Multiday (cued) naming (PPC)*	41	.28 (0·22)
5-minute recognition	48	.40 (0·22)
Multiday recognition	48	.48 (0·25)

NOTES: PPC = Proportion of Phonemes Correct. For cued naming (*), calculation of PPC excluded the child's production of the first syllable of the nonword, as the first syllable was the phonological cue. TENR = Test of Early Non-word Repetition; PPVT-4 = Peabody Picture Vocabulary Test-4; GFTA-2 = Goldman Fristoe Test of Articulation-2.

Elicited imitation and extant vocabulary together accounted for 33% of the variance in naming scores ($R^2 = .33$). Again, the unique variance accounted for by each predictor was calculated. Elicited imitation was significant ($F(1,43) = 9·121$, $p = .004$, $R^2 = .18$), as was extant vocabulary ($F(1,43) = 9·817$, $p = .003$, $R^2 = .19$). Finally, for multiday (cued) naming, age and extant vocabulary were entered into the regression. Age was excluded and the remaining model was significant ($F(1,40) = 23·105$, $p = < .0001$). Vocabulary alone accounted for 37% of the variance in multiday cued naming scores ($R^2 = .37$).

DISCUSSION

The main aim of this study was to examine the role of elicited verbal imitation during the early timecourse of word learning in toddlers. We also examined the relative contribution of verbal imitation and existing speech and vocabulary abilities to word learning over time. We predicted that the toddlers' elicited verbal imitation accuracy of nonwords linked to referents during training would predict later naming accuracy and recognition of those nonwords. Our predictions were partially confirmed – verbal imitation was related to naming (at 1 minute and 5 minute [cued]) but not recognition. Recall that uncued naming at 5 minutes and multiday could not be analyzed due to close to floor performance. Thus, hereafter in this discussion, when referring to naming at the later two time-points, we are referring to cued naming. While we recognize that providing the phonological cue of the first syllable supported the retrieval of the nonword

at these two time-points, some level of retrieval for the remaining word form was still required by the child. Accuracy of elicited imitation during training uniquely accounted for 18% of the variance for both 1- and 5-minute naming. Elicited imitation was as strong a predictor as extant vocabulary size at these early time-points. When existing vocabulary and elicited imitation were entered into the regression model, in combination, these predictors accounted for 31% of the variance in 1-minute naming and 33% for 5-minute naming. But at multiday testing, vocabulary alone accounted for the children's naming accuracy; elicited imitation was not predictive. A somewhat surprising finding was that the relationship between elicited imitation and naming was not mediated by the children's expressive phonology abilities, as there was no correlation between elicited imitation and GFTA-2 or later naming and GFTA-2. As predicted, there was a positive, albeit marginal, relationship between elicited imitation during training and extant vocabulary, in keeping with previous research (Hoff *et al.*, 2008; Roy & Chiat, 2004; Stokes & Klee, 2009a). Finally, we investigated the relationship between the toddlers' elicited verbal imitation accuracy of nonwords linked to referents and verbal imitation accuracy based on their performance during a NWR task. We assumed a relationship would exist as both tasks tap into toddlers' abilities to imitate. However, no association between these two measures was found. What follows is a discussion of the results. First, we address why elicited imitation predicted naming within the same session. Second, we discuss why extant vocabulary predicted naming over all time-points and why a positive correlation was found between extant vocabulary and elicited imitation. Third we discuss why elicited imitation did not predict recognition, and why it did not predict multiday naming. In addition, we address the lack of correlation between elicited imitation and performance on a NWR test, and why expressive phonology did not correlate with elicited imitation or with naming at any time-point.

In this study, we isolated elicited imitation during training from other measures of initial word learning ability, and systematically examined how this skill, in conjunction with existing speech and language abilities (previously known to be associated with toddlers' vocabulary knowledge), contributed to word learning over time. Overall our findings suggest that verbal imitation is a skill that contributes to learning to say new words, particularly at the cusp of learning. As word learning unfolds over time, other skills that the child brings to the process become more salient, namely extant vocabulary.

In relation to elicited imitation, Abbs, Gupta, and Khetarpul (2008) suggest that imitation provides the opportunity to execute an articulatory-phonological plan for a new word. In their investigation of the role of elicited imitation in expressive word learning they concluded that imitation was not necessary

(at least for monolingual young adults) but cautioned that there may still be a role for elicited imitation during the period of language acquisition. Our data would suggest this is the case, at least at the very beginning of the word learning process in typically developing toddlers. Research by Keren-Portnoy, Vihman, DePaolis, Whitaker, and Williams (2010) found that a toddler's experience with producing a sound or sound sequence influenced accuracy when repeating real and nonwords. Words and nonwords that contained sounds or sound sequences that the child had experience producing were more accurately imitated. In the current study, imitation predicted cued naming within the same session. Perhaps the act of imitating the target nonword during training provided experience with the sound sequences that it contained, which also allowed for the execution of an articulatory-phonological plan, thus providing practice. One caveat here relates to our methodology. It is possible that because we asked the children to participate in recognition testing first and then naming at 5 minutes (cued), our naming results could be influenced by the additional exposure heard during recognition testing and the children's phonological working memory skills. However, if phonological working memory was the only significant contributor to a child's word naming accuracy then we are puzzled as to why we did not see a positive relationship between the TENR and naming accuracy over time. Instead we observed elicited imitation accuracy uniquely contributing to naming at the 5-minute interval.

Extant receptive vocabulary predicted naming, both within the same session and as it unfolded over time. It seems that a child's existing lexicon provides support in learning new words in that these new word forms can be linked with existing phonological or semantic neighbours (Storkel, 2001; Storkel & Adlof, 2009). But what is it about a child that helps them to build vocabulary knowledge in the first place? Perhaps one skill that assists them is imitation itself. We suggest that imitation and existing vocabulary are likely to be reciprocal supports. That is, imitation can support vocabulary growth, and larger vocabularies can support imitation. We know that, in this study, imitation correlated with naming at 1 and 5 minutes. Perhaps in real-world learning, this early naming could provide opportunities for adult input to respond to the child about the word's meaning, which fosters word learning over time and results in vocabulary growth. Having a larger vocabulary could further support and bolster imitation abilities. Indeed, extant vocabulary as measured by the PPVT-4 and the accuracy of imitation of the to-be-learned nonwords was correlated.

Contrary to our predictions, elicited imitation did not predict recognition at 5 minutes or multiday, nor did it predict naming at the later multiday time-point. As mentioned, this prediction was tentative as it was based on research that has found a relationship between imitation and receptive

vocabulary (Roy & Chiat, 2004). However, recognition during a word learning task and extant receptive vocabulary knowledge are likely to be quite different in terms of time and experience related processes. New words require a stronger level of encoding which is only possible over an extended period of time and with more exposures, in contrast to established receptive vocabulary which presumably has already undergone this process. It could also be that the lack of association between imitation and recognition within our word learning task may simply be an issue of measurement. Recognition was tested by a four alternative forced-choice task which may not have produced a sufficient spread of scores to show an association with imitation as measured by PPC. While we offer these postulations, we acknowledge that further investigation of the relationship between recognition of new words over time and elicited imitation of these words during training is needed, given the limited research currently available. But what about the lack of relationship between elicited imitation and later naming accuracy? This was a puzzling finding. We presumed that toddlers who were good at imitating would also be good at naming at the later multiday time-point because they had more opportunity to establish a better connection between the referent and word form. Thus it seems that imitation enables better encoding of new words forms into short-term memory (evident at 1- and 5-minute testing) but that memory consolidation and other skills (namely, existing vocabulary) supplant imitation as better predictors of naming over time (multiday testing). That is, although a toddler may be able to imitate a new word, imitation of that word does not guarantee that the word will be learned. Other abilities are important for consolidating fragile mappings of newly heard words.

It was also interesting to find a lack of association between elicited imitation of the trained nonwords and NWR. This indicates that NWR (where there is no referent) and imitation of nonwords (when linked to a referent) may be quite different tasks. Unlike nonword repetition, the elicited verbal imitation involved the children repeating a nonword that they had been exposed to six times in a training script, therefore repetition priming could be at play during the elicited imitation. Moreover, in elicited imitation the nonword was explicitly linked to a novel referent. In this task, the children had started the process of encoding that nonword, whereas in NWR no meaning is linked with the nonword. Heisler, Goffman, and Younger (2010) have demonstrated that children's articulation of new word forms is more stable if those forms have been learned in association with a referent than if they have been learned in isolation. That is, there is something important about realizing the lexical status of these forms that makes a difference in their learnability.

It was somewhat perplexing to observe that the children's expressive phonology was also not related to naming of the nonwords at any time-point, nor was it related to elicited imitation of those nonwords. Moreover, it was also not related to performance on the TENR. This led us to examine the different phonological targets of these three tasks: the GFTA-2, the TENR, and the word learning task.

Briefly, the GFTA-2 comprises real words with 94% mono- and di-syllables and a variety of consonants. The TENR comprises 1–4-syllable nonwords and a variety of early and later developing consonants. In our word learning task, the target nonwords were 2 or 3 syllable, comprising earlier developing consonants. Keren-Portnoy and colleagues (2010) designed nonwords that contained sounds that were both IN and OUT of toddlers' individual phonetic inventories and found that this impacted accuracy, with greater accuracy for words that contained sounds within the child's phonological capabilities. In the light of these observations, it is possible that differences in the phonological characteristics of the stimuli in the word learning task and the TENR resulted in a lack of correlation between the elicited imitation and the TENR, and may also explain why elicited imitation was predictive of later naming but the TENR was not. Furthermore, the differences between the stimuli in the GFTA-2 and these two tasks may explain why no relationships were found with this measure of the toddlers' expressive phonology. Future research would be needed to more closely examine the nature of the relationship or lack thereof between expressive phonology, elicited verbal imitation of trained nonwords linked to referents, and toddlers' abilities to learn those trained nonwords. It is possible that by increasing the phonological complexity (either by including later developing consonants or increased word length), relationships between these variables may be uncovered.

The results of this study are limited by the characteristics of the sample recruited, in that the group of children presented with above-average receptive vocabulary and expressive phonology. The mean years of maternal education was also high. Together, these factors indicate that the sample is not representative of the wider population. While the results and interpretations provided are applicable to the current sample, different results and therefore implications may be seen in a sample with a wider spread of skills and characteristics. Future research that includes a larger population-based sample as well as a clinical population such as late-talking toddlers, who characteristically have small vocabularies and poor expressive phonological skills, would be of value. Such research may yield different insights to those reported in this paper about elicited imitation and how it may contribute to learning to talk, amongst other existing speech and language skills.

Verbal imitation seems to play a role in toddler word learning. It may be important at the initial cusp, when toddlers are first exposed to new referents and word forms. However, the experience of imitating in and of itself may not be sufficient to facilitate vocabulary growth over time. Other factors, both internal (e.g. existing lexicon) and external (e.g. time and experience) to the child, are important for consolidating the initial fragile encodings of word forms.

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