Parental assessed productive vocabulary predicts later formal language, not later language use

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ABSTRACT

Previous research has shown longitudinal connections between children's growth rate of observed number of word types in spontaneous production and later language abilities (Rowe et al., 2012). It is unknown whether this relationship can be identified through parental reports representing children's productive vocabulary.

Using longitudinal parental reports (N=64), we examined the predictive value of size, velocity, and acceleration of the parental reported assessments of the productive vocabulary for measures of later core language ability (measures of receptive vocabulary (PPVT) and productive grammar (Morphosyntactic accuracy)), and later measures tracking language use and pragmatic skill (measures of conversational responses in free interaction and the comprehension of conversational implicatures). We also included control variables (SES, siblings, Literacy deficiencies in family history) and we specified hypothesis for all included predictors in line with previous findings (e.g. Matthews et al., 2018; Pagmar et al., 2023).

Vocabulary growth was modelled as follows. For each child i, the vocabulary size y at age t is

$$y_{ti} = \alpha + \gamma_{0i} + \gamma_{1i}(t - 24) + \gamma_{2i}(t - 24)^2 + \varepsilon_i, \; \varepsilon_i \sim (0, \sigma_{\varepsilon i}^2)$$

where t = ages (18, 21, 24, 27, 30 months), α = average vocabulary size at 24 months, γ_{0i} = vocabulary size of the ith child at 24 months (difference from the average vocabulary size). γ_{1i} =

vocabulary growth velocity of the ith child, and γ_{2i} the vocabulary growth acceleration or deceleration of the ith child. γ_{0i}, γ_{1i}, and γ_{1i} were used to predict linguistic abilities at later ages. Observed and modelled vocabulary growth can be viewed in Figure 1.

For a small subset of our sample, we also examined the relationship between parental reported assessment of productive vocabulary and observed number of word types in spontaneous production at the same ages, at four different occasions. Large scale observations of spontaneous production have higher resource demands than parental reports. Our goal was to investigate if parental reports were as informative as observed spontaneous production.
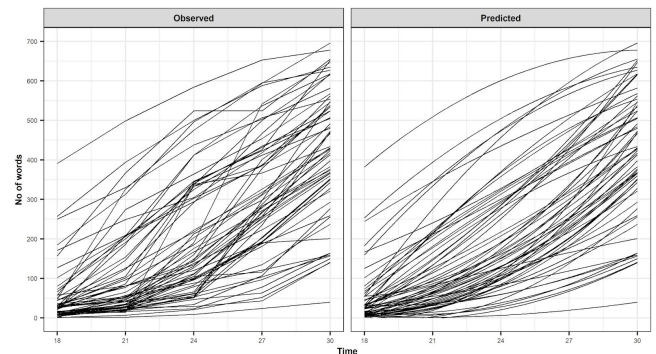

Figure 1. Observed and modelled vocabulary growth of each child in the sample during the 18-30 month period.

Results show that growth rates from parental reports of productive vocabulary inform later language ability, but not to the same extent as in
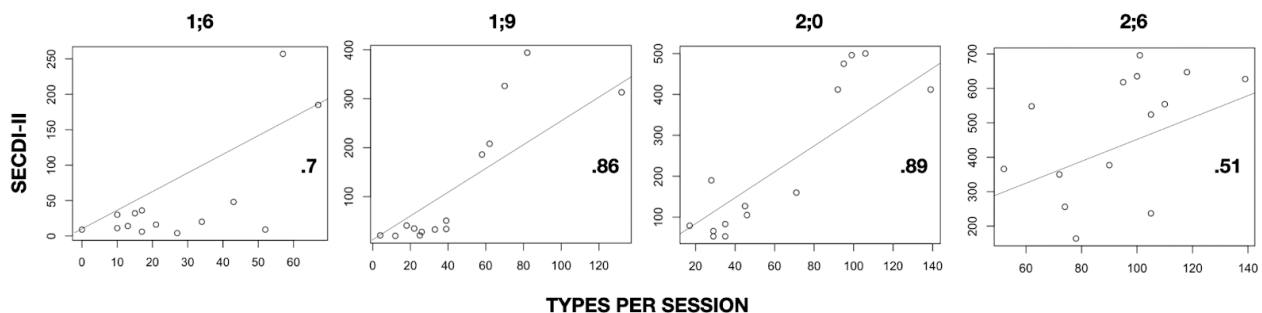

Figure 2. Results of linear regression models predicting late linguistic abilities on the basis of early vocabulary development parameters.

previous research (Table 1). One suggested explanation for this finding is differences between measures representing vocabulary. No connections were found between early assessment of the productive vocabulary and later language use/pragmatic skill, which is in agreement with

one of two suggested outcomes, indicating that the early state of the lexicon is not informative for the included measures of later language use.

As expected, we found high correlation coefficients between assessment of productive vocabulary and number of word types in spontaneous production (Figure 2), which can be explained by the vast variance in lexical access during early development rather than the accuracy of the included measures. At any of the observed ages the vocabulary measures contained vast variation. At 1:9, the lowest reported amount is 1 word, while the highest number of words are 391. The correlation coefficients are driven by a group of children, positionen at the lower end of both vocabulary measures.

There are at least three different scenarios that can be suggested as interpretations of the results concerning early vocabulary and pragmatic skill:

1. assessments of the early productive vocabulary and the study specific pragmatic measures are unrelated,

2. the measures are observed at occasions too far apart and the individual trajectories have not yet reached a point where the relationship between the measures are detectable, or

3. a measure representing the productive vocabulary could be predictive for the later pragmatic measures if it also included a behavioural production component, based on an assumption that the capability to communicate and the willingness to do so are not necessarily the same thing.

Table 1. Results of the models showing the predictive levels of size, velocity and acceleration of the productive vocabulary for measures of Morpho-syntactic accuracy, Receptive vocabulary (PPVT@33 months and PPVT@48 months), comprehension of Conversational implicatures, and Appropriate, Non-con-tingent, and Missing responses in free conversation.

Morphosyntactic accuracy				
Coefficient	β	Std.error	p	r²
(Intercept)	37.61	7.16	<0.001***	23.59%
Sibling	-8.03	2.86	0.07**	
SES	0.92	0.83	0.819	
Literacy	2.57	2.77	0.180	
Size	0.02	0.01	.05†	29.78%
Velocity	0.12	0.10	0.27	25.70%
Acceleration	-1.57	1.03	0.13	27.48%

	PPVT 33				PPVT 48			
Coefficient	β	Std.error	p	r²	β	Std.error	p	r²
(Intercept)	36.40	10.09	<0.001***	2.38%	66.97	11.76	<0.001***	8.48%
Sibling	-2.22	3.72	0.55		-9.63	4.34	0.03*	
SES	0.36	1.17	0.75		-0.33	1.36	0.80	
Literacy	3.60	3.81	0.34		2.39	4.44	0.59	
Size	0.05	0.01	<0.001***	25.13%	0.04	0.02	0.01*	17.10%
Velocity	0.34	0.15	<0.02**	10.28%	0.42	0.18	0.02*	16.56%
Acceleration	-3.47	1.18	<0.005**	15.08%	-1.59	1.46	0.27	10.33%

	Conversational Implicatures				Appropriate Responses			
Coefficient	β	Std.error	p	r²	β	Std.error	p	r²
(Intercept)	11.26	2.11	<0.001***	0.58%	0.57	0.08	<0.001***	4.77%
Sibling	-0.27	0.84	0.74		-0.02	0.02	0.39	
SES	0.06	0.24	0.78		0.007	0.009	0.45	
Literacy	0.03	0.82	0.96		-0.01	0.03	.63	
Size	-0.0007	0.003	0.81	0.71%	<0.0001	0.0001	0.49	5.99%
Velocity	-0.04	0.03	0.22	3.95%	0.0006	0.001	0.57	5.60%
Acceleration	-0.24	0.31	0.44	1.95%	0.007	0.01	0.47	6.09%

	Non-contingent Responses				Missing Responses			
Coefficient	β	Std.error	p	r²	β	Std.error	p	r²
(Intercept)	0.02	0.01	0.01*	11.03%	0.16	0.09	0.08†	1.14%
Sibling	-0.00	0.00	0.16		-0.00	0.03	0.77	
SES	-0.00	0.01	0.11		-0.00	0.01	0.86	
Literacy	0.00	0.00	0.59		-0.02	0.03	0.52	
Size	0.00	0.00	0.8	11.17%	-0.00	0.00	0.27	4.37%
Velocity	0.00	0.00	0.29	13.69%	-0.00	0.00	0.46	2.57%
Acceleration	-0.00	0.00	0.43	12.47%	0.00	0.01	0.91	1.17%

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