



HAL
open science

Perceptual abilities in relation with motor development during the first year of life

Marjorie Dole, H el ene Loevenbruck, Olivier Pascalis, Jean-Luc Schwartz,
Anne Vilain

► **To cite this version:**

Marjorie Dole, H el ene Loevenbruck, Olivier Pascalis, Jean-Luc Schwartz, Anne Vilain. Perceptual abilities in relation with motor development during the first year of life. WILD 2015 - 2nd Workshop on Infant Language Development, Jun 2015, Stockholm, Sweden. hal-01301013v2

HAL Id: hal-01301013

<https://hal.science/hal-01301013v2>

Submitted on 12 Apr 2016

HAL is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destin ee au d ep ot et  a la diffusion de documents scientifiques de niveau recherche, publi es ou non,  emanant des  tablissements d'enseignement et de recherche franais ou  trangers, des laboratoires publics ou priv es.

Dole, M.¹, Loevenbruck, H.², Pascalis, O.², Schwartz, J.L.¹, Vilain, A.¹.

¹ GIPSA-lab, Département Parole & Cognition, CNRS & Université Grenoble Alpes, Grenoble, France

² Laboratoire de Psychologie et NeuroCognition, CNRS & Université Grenoble Alpes, Grenoble, France

Introduction

Phoneme categorization

- Infants show discrimination of syllables as soon as 1 month of age despite speaker variability (Eimas et al., 1971; Eimas, 1974).
- **Problem of invariance:** ability to detect a consonant in ≠ syllable contexts despite acoustic variations: argument for the Motor Theory (Liberman et al., 1967).
- A recent study claimed that 6-month olds but not 3-month olds solve the invariance problem (Hochmann et al., 2014) and argue against a motor interpretation since babbling occurs later.

• Standard: (baseline) *bead-bad-boat* (target) *boo*

• Deviant: (baseline) *bead-bad-boat* (target) *due*

Greater pupil dilatation for the deviant target than for the standard target.

However

- Are infants detecting invariance or just acoustic differences between stimuli?
- Does babbling only start at 6 months?

Goals of the present study

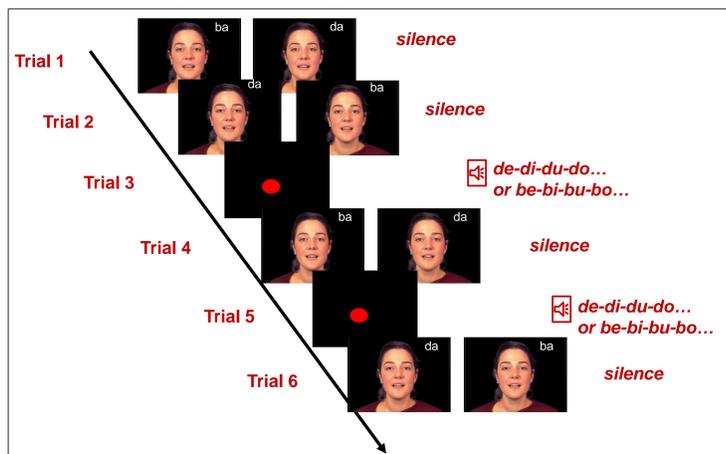
- Assess the ability to detect invariants and the role of motor knowledge in 6-to 12-month old infants.

Methods

Participants: 41 6- to 12-month old infants.

- 12 6months (8M), mean age= 6.45, sd= 0.1.
- 14 9mo (7M), mean age= 9.47, sd= 0.16.
- 15 12mo (6M), mean age= 12.48, sd=0.19.

Intersensory matching procedure (Pons et al., 2009)



Parental questionnaire assessing infants' production abilities
29 infants out of 41: 6 6mo, 11 9mo, 12 12mo

Hypotheses

- If infants have plosive categories they should associate the sound in one vocalic context with the visual gesture in another vocalic context
- If motor knowledge plays a role this should vary according to babbling abilities

Analysis: intersensory matching.

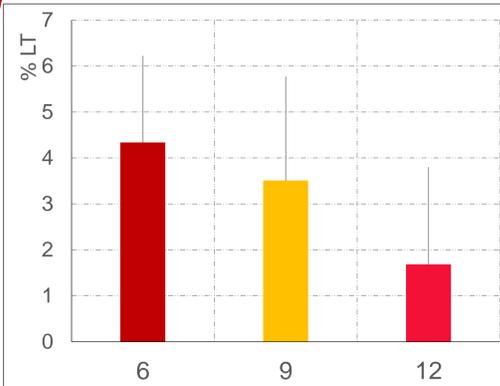
- % Looking Time (LT) for Baseline (1&2) and for Test (4&6).
- **Difference score** = %LT Test – %LT Baseline.

Analysis: production. Infants were classified as:

- **No Babbling:** no syllable or monosyllable
- **Canonical Babbling:** reduplicated CVCVCV with /a/
- **Variegated Babbling:** CVCVCV with different vowels

Preliminary Results

Effect of Age



- **Plosive categorization abilities** ($p < 0.05$): preference for stimulus presented during familiarization (Trials 3&5).
- Significant for 6-mo ($p < 0.05$), trend toward significance for 9-mo olds. ($p = 0.07$).
- No significant between-groups difference.

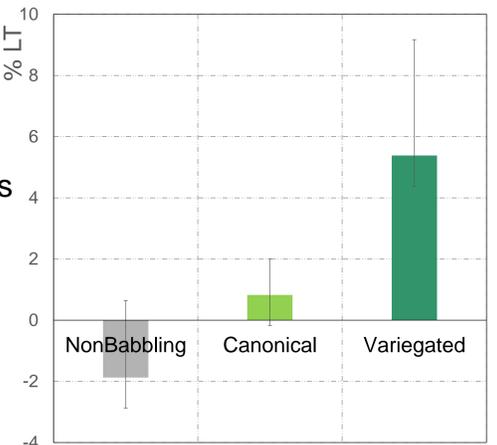
Effect of Production abilities

Non Babbling: 7 infants (4 6mo, 2 9mo, 1 12mo).

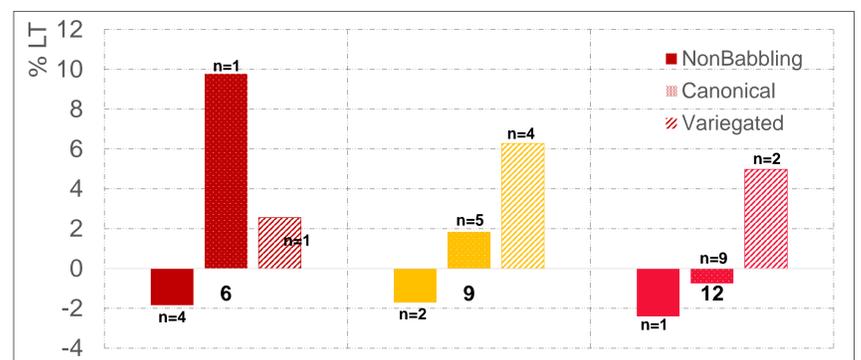
Canonical Babbling: 15 infants (2 6mo, 9 9mo, 4 12mo)

Variegated Babbling : 7 infants (1 6mo, 4 9mo, 2 12mo)

- No matching for NonBabbling & Canonical infants ($p > 0.05$).
- Trend toward significant matching for Variegated infants ($p = 0.09$).
- Trend toward better matching for Variegated than NonBabbling infants ($p = 0.06$).



Interaction Age by Production abilities



Conclusion

- Infants showed a preference for videos pronouncing the consonant with which they had been familiarized.
They performed intersensory matching in spite of the varying vowel context (invariance for plosive place of articulation?)
- This performance seems to be present from 6 months of age comforting Hochmann et al.' results
- **Effect of production abilities:** infants producing [b] and/or [d] with varying vowels are better at matching than infants who don't produce the contrast, or who only produce the contrast with a single vowel.
Role of the perceptuo-motor link in categorization?
- No association in 12-month old infants: inadequate procedure? Emergence of the preference for new stimuli at 12mo?

References

- Eimas, P.D., Siqueland, E.R., Jusczyk, P., Vigorito, J. (1971). Speech perception in infants. *Science*, 171 (3968), 303-306.
- Eimas, P.D. (1974). Auditory and linguistic processing of cues for place of articulation by infants. *Perception & Psychophysics*, 16 (3), 516-521.
- Hochmann, J.R. & Papeo, L. (2014). The invariance problem in infancy: A pupillometry study. *Psychological Science*, 25 (11), 2038-2046.
- Liberman A.M., Cooper, F., Shankweiler, D., & Studdert-Kennedy, M. (1967). Perception of the speech code. *Psychological Review*, 74, 431-461.
- Pons, F., Lewkowicz, D.J., Soto-Faraco, S., & Sebastian-Galles, N. (2009). Narrowing of intersensory speech perception in infancy. *PNAS*, 106 (26), 10598-10602.