Infant speech perception

November 29, 2014

Course code: PSY2012
Semester: Autumn 2014
Candidate number: 10077
Course responsible: Ruud van der Weel

Contents

Introduction

"The faculty or act of expressing or describing thoughts, feelings, or perceptions by the articulation of words." [2]. For infants it is the same thing, only that infants are very bad at it. So speech for infants are regarded as its own research area, where the perception of speech is important. A main focus is the development of perception over time, during the first six of twelve months of infancy.

This essay will look into a tiny sample of the latest articles available. That will give insight into the current research of infant speech and its perception. Overview of the current state of research, in a specific field of research, is important due to the fact that a research field is moving fast. New discoveries and inventions comes faster and faster, and it will be harder over time to keep up with current events.

A quick article search resulted in many resent articles, but few directly related to speech in infants, and perception of it. But a selection was found of sciencedirect.com. The four chosen articles present work in the field, more specifically about infants perception of fluent speech.

Lewkowicz et al. (2015) describes multisensory audiovisual speech and infants perception of it [3]. McMurray et al. (2013) talks about the development of speech perception and infant directed speech [4]. Pins and Lewkowicz (2014) has a different angle, and looks at speech synchrony and unfamiliar fluent speech [5]. Kubicek et al. (2014) looks at the intersensory perception of fluent speech [6].

Outline Continuing the essay a brief description of speech development and language perception will be followed by the presentation of, the previously mentioned, four articles and their contribution to the research field. Lastly there will be a concluding section that sums up the findings of the articles and the contribution of this essay.

Infant speech

For factual basis we should know what speech development of infants are, and how infants develop their perception of language in the first twelve months. This is a brief description, in a more extensive essay this would be elaborated further.

Speech development foetuses can process sounds of mothers speech, and distinguish language and other sounds. Newborns prefer their mothers muffled voice. Prefer mothers voice over others. Also prefer native language over others. In the first months babies learn how to differentiate rhythmic groups of languages; stress-time, syllable-timed, and mora-timed. [1]

Language perception develops quickly in the first 6 months. In that period infants learn how to distinguish vowels, and their perception start to reflect contrasts in the mother tongue [1]. Distinction of non-native contrasts are no longer easy for children after 10-12 months. Different categories are also perceived to a varying degree. After 6 months infants find it harder to discriminate prototypes.

Consonants are easier to distinguish than vowels. Vowels and consonants are easily distinguished. Manners of articulation are also discriminated within the first 6 months. Voicing can also be a problem for infants. Auditory and visual information if perceived by infants, but not always integrated together. [1]

Fluent audiovisual speech in infancy. The paper of Lewkowicz et al.(2015) investigates infants of 4-, 8- to 10-, and 12- to 14-month old English learning infants. Emergence of mulitisensory perception and development of its coherence to audiovisual fluent speech is investigated.[3]

Four experiments create the base of the discussion in the paper.

The first experiment tests if 4-month-old infant can match synchronous audible and visible speed streams [3]. Infants focus on the face is used as a trigger mechanism for multisensory coherence. It is assumed that infants focus more on the face of a talking person when they try to learn how to combine, or synchronise, auditory and visual input.

The second experiment is the same as the first one, except this time 8- to 10-month-old infants are used. It extends the from the results of the first experiment, where it was indicated that 4-month-old infants does not perceive in a coherent multisensory way. The age range for experiment two was chosen because it is around this age that infants begin to attend specifically to audiovisual speech.

Experiment three takes the negative results of the first two experiments and changes the age factor. This time 12- to 14-month-old infants are used in the experiment. And the paper expected that by this age infants would perceive multiseonsory speech coherence. [3]

The fourth experiment focuses on the language aspect. Experiment three shows that 12- to 14-month-old infants successfully detect coherence with both Spanish and English. To test the language aspect the audiovisual material was desynchronised, and experiment 3 was repeated with the new data.

Resulting from the four experiments it is shown that 12- to 14-month-old infants do not depend on the visual and audible speech streams being synchronised, while they evidence of multisensory matching.

IDS, development of speech perception. IDS, infant directed speech, "is a speech register characterized by simple sentences, a slower rate, and more variable prosody"[4]. The paper looks into recent developments in IDS, and focus on a new cue, Voice onset time among other things.

The article sets out to three questions: 'Does IDS improve perception and development?', 'Does the effect of IDS extend to new contrasts?', and 'Are IDS effects independent if more basic changes?'[4]. These questions are elaborated in an experiment. The participants of the experiment was English speaking Caucasians in parent-infant dyads. Infants aged from 9 to 13 months.

In general terms the article finds that segmental cues associated with IDS might be a by-product of a different prosodic structure and slower rate of speech. This effects the statistical learning of speech in infants.

Speech synchrony. The article of Pons and Lewkowicz (2014) looks at the effect of linguistic experience and language familiarity, with its relation to audio-visual synchrony in fluent speech. Delay of 366, 500, and 666 ms are used on the video streams in the experiments. Spanish and Catalan was used in different groups in the first experiment. While English was used with the same groups as before in the second experiment. [5]

The experiments resulted in both groups detecting a 500, and 666 ms asynchrony. The language familiarity also consistent with the, usually observed, perceptual tuning in infant response to linguistic input. Concluding the article says that 'there is little doubt that the complexity of fluent speech is likely to interact with older infants' increased efficiency and expertise fir processing audiovisual fluent speech'[5].

Intersensory perception of fluent speech. Kubicek et al. (2014) checks whether or not IDS facilitates intersensory matching of audio-visual fluent speech. This is checked with 12-month-old German-learning infants, using German and French fluent speech.

The paper has two experiments, one where sentences was voiced in adult directed manner, and the second where sentences was pronounced in IDS manner. In the first experiment 12-month-old infants did not exhibit matching of visual and auditory input. In the second experiment infants did perceive relations between visual and auditory information. So the article concludes that IDS might influence intersensory perception of fluent speech.

Conclusions

As discussed in the previous section we can see that fluent speech is an interesting trend in the research field of infant speech perception. The consensus is that fluent speech has its effects on infant speech perception. I would argue that fluent speech has an increased learning effect, but only as a natural extension of the early stages of infant speech perception in the age up to around 12 months.

The different experiments mentions across the articles presented shows that audio-visual

stimuli has a definite effect on perception. But that it is not until after 10 or so months that infants start to process this kind of sensory input in combination. Before this stage infants mostly focus on sounds, vowels and consonants. While afterwords full words and later sentences, rather pictures of words not sounds, become the focus.

State of the art wise, we can see that fluent speech in infant speech perception is trending, and that the different approaches look similar approached of research. A common denominator is the multisensory input and what effects it has on speech perception of infants.

References

[1] Kjellrun Englund, Lecture slides, Cognitive Psychology, PSY2012, NTNU, autumn 2014.

[2] Definition of 'speech', from the free dictionary, 28.011.2014: http://www.thefreedictionary.com/speech

[3] David J. Lewkowicz, Nicholas J. Minar, Amy H. Tift, Melissa Brandon. Perception of the multisensory coherence of fluent audiovisual speech in infacy: Its emergence and the role of experience. Journal of Experimental Child Psychology, 130 (2015), 147-162.

[4] Bob McMurray, Kristine A Kovack-Lesh, Dresden Goodwin, William McEchron. Infant direct speech and the development of speech perception: Enhancing development or an unintended consequence? Cognition 129 (2013) 362-378.

[5] Ferran Pins, David J. Lewkowicz. Infant perception of audio-visual speech synchrony in familiar and unfamiliar fluent speech. Acta Psychologica 149 (2014) 142-147.

[6] Claudia Kubicek, Judit Gervain, Anne Hillairet de Boisferon, Oliver Pascalis, Hélène Lævenbruck, Gudrun Schwarzer. The influence of infant-direct speech on 12-month-olds' intersensory perception of fluent speech. Infant Behavior & Development 37 (2014) 644-651.