When ‘BAB’ becomes ‘DAD’:
Development of Auditory-Visual Speech Perception in English-Speaking Children

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BACKGROUND
- Visual influence on speech perception varies across languages:
  - American-English > Japanese (Sekiyama & Tohkura, 1993)
  - Japanese > Mandarin (Sekiyama, 1987)
- Developmental evidence for auditory-visual speech perception (AVSP):
  - Infants perceive visual speech (Burnham & Dodd, 2003; Desjardins & Werker, 2003; Rosenblum et al., 1997).
  - Visual speech influence increases with age (McGurk & MacDonald, 1976)
- Developmental + cross-language (Sekiyama & Burnham, 2003):

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<th>6-year-olds</th>
<th>8-year-olds</th>
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RESEARCH QUESTION
What factors affect the increase in auditory-visual speech perception in English-speaking children between 6 and 8 years of age?

EXPERIMENT 1A: SCHOOL CHILDREN

METHOD
Participants
N=96; 5-ys (n=24), 6-ys (n=24), 7-ys (n=24), 8-ys (n=24)

Stimuli & Dependent Variables
- AVSP:
  - Auditory-only (AO)
  - Visual-only (VO)
  - Auditory-Visual (AV)
  - AV Congruent: A/ba / V/ba; A/da / V/da; A/ga / V/ga
  - AV Incongruent: A/ba / V/ga; A/da / V/ba; A/ga / V/da
- Visual Speech Index (VSI) = AV Congruent - AV Incongruent

Language Specific Speech Perception (LSSP):
18 native [pa] vs. [p$a$] & 18 non-native [ba] vs. [pa]
LSSP Score = Native DI - Non-native DI

Discrimination Index (DI) = Hits - False positives / Trials

Articulation: Queensland Articulation Test (QAT)
  - Initial, medial and final position consonants in 64 picture items
  - Articulation Score = Correct Responses / 64

Reading: WRAT-3 reading subtest: 15 letters + 42 words
  - Reading Score = Correct Responses / 57

RESULTS (ANOVAs)
- Increase in VSI (p < 0.02) and lipreading (VO) (p < 0.01)
- Greater visual speech influence for native AV stimuli (p < 0.05)
- Greater visual speech influence in noise (p < 0.01)

REGRESSION ANALYSES
- Age + AO + Lipreading (VO) + LSSP + Reading + Articulation → VSI
- Age + AO + VSI + LSSP + Reading + Articulation → Lipreading

DISCUSSION
- Use of visual speech is related to selective attention to native speech.
- Use of visual speech is related to selective attention to native speech.
- Perhaps the high cognitive demands of exposure to new faces, accents, etc. at school is similar to high cognitive demands of reading, which necessitates the use of visual speech information.

EXPERIMENT 1B: ADULTS

METHOD & RESULTS
- Same dependent variables as in Experiment 1A (N=48)
- Regression Analyses:
  - Age + AO + Lipreading (VO) + LSSP + Reading + Articulation → VSI
  - Age + AO + VSI + LSSP + Reading + Articulation → Lipreading

DISCUSSION
- Only AO predicts VSI. Over age skills become ‘automatic’ and ‘independent’ of each other, hence they are not as strongly interlinked as in school years, which require tackling linguistic challenges.

CONCLUSION
- Visual speech information is used to meet linguistic challenges.
- In the early school years linguistic abilities LSSP, AVSP and lipreading are interconnected (Exp 1A).
- In the preschool years and adulthood, AVSP is best predicted by AO speech perception (Exps 1A & 2).
- There is AVSP in infancy and childhood. It appears that the linguistic challenge at school onset brings on a more phonemic language-specific AVSP over and above the phonetic AVSP in infancy.