

# Research & Singing Development

## Physical, Psychological, Social & Pedagogical Aspects

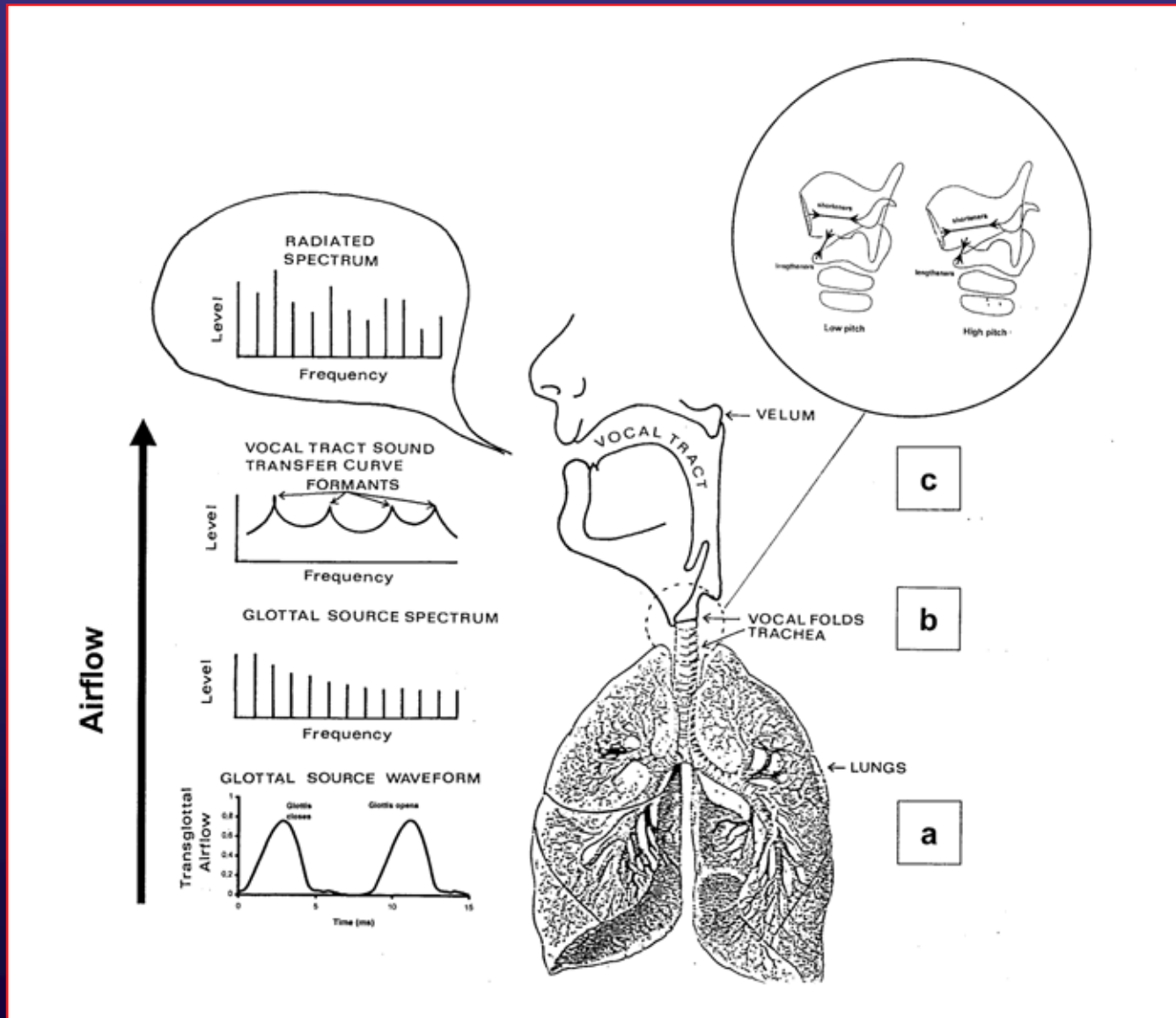
Professor Graham F Welch

Institute of Education

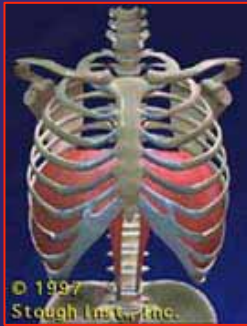
University of London

# Physical

# The Human Voice: A tripartite system



# Vocal *loudness*



QuickTime™ and a  
Cinepak decompressor  
are needed to see this picture.

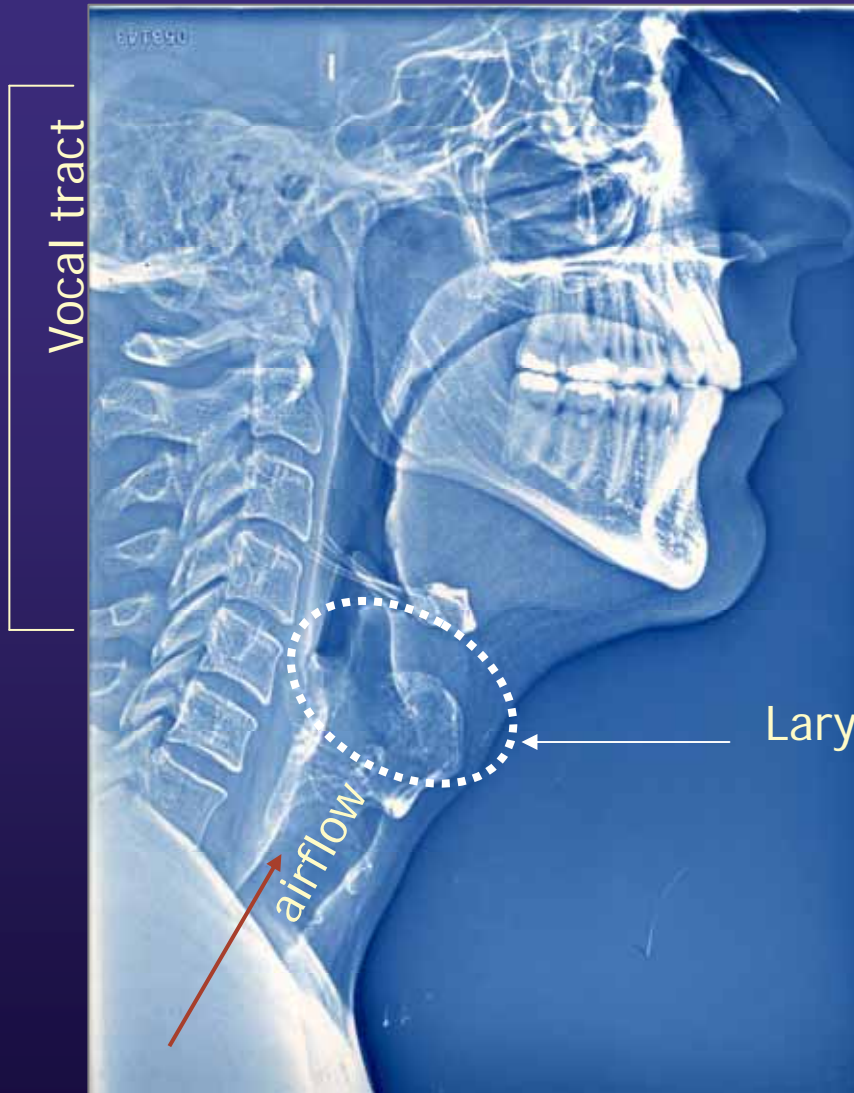
*The air pump:*

Diaphragm +

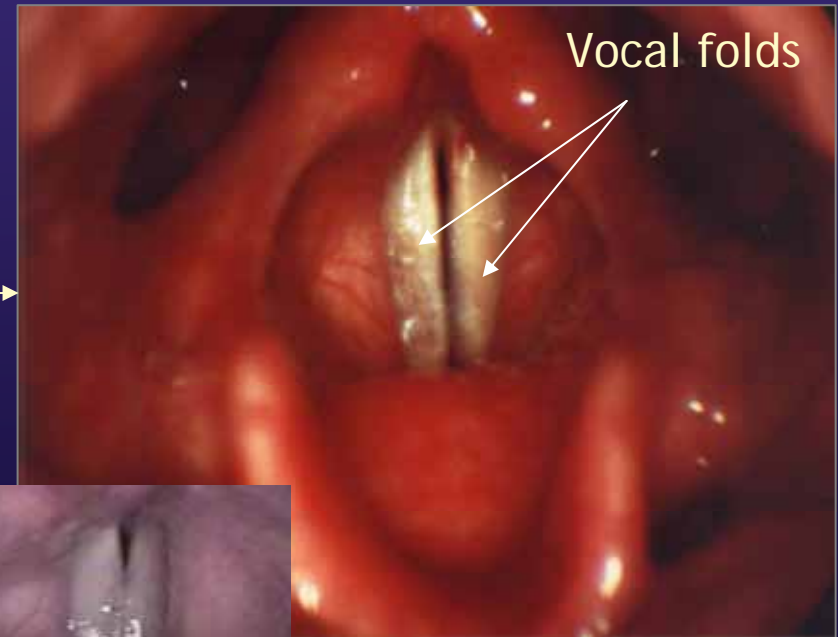
- Abdominal muscles  
= 'platform' of voice
- Ribs = subtle changes

# Voice source & Voice amplification

(Welch, 1989; 2005)



Lateral view of head & neck



Top-down view of the larynx & vocal folds





Soprano 'at rest'



Soprano singing [i]  
e<sup>4</sup> 330Hz

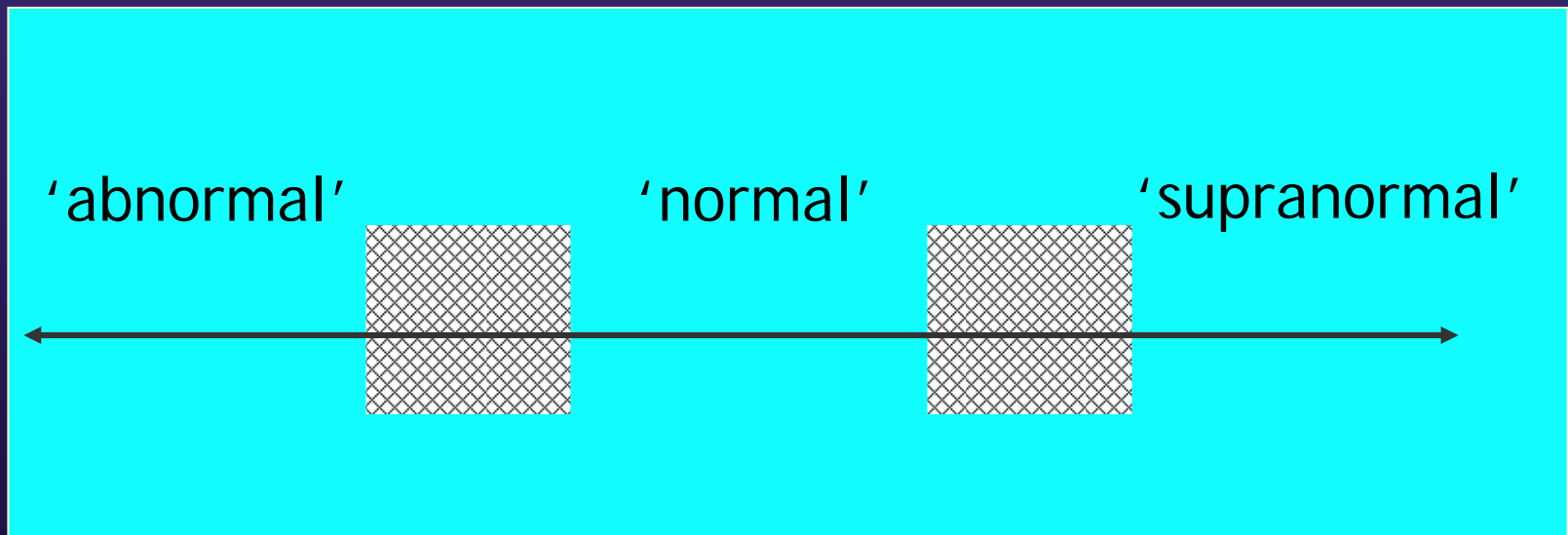


Soprano singing [i]  
c<sup>6</sup> 1000Hz

# Phases of physical vocal development across the lifespan

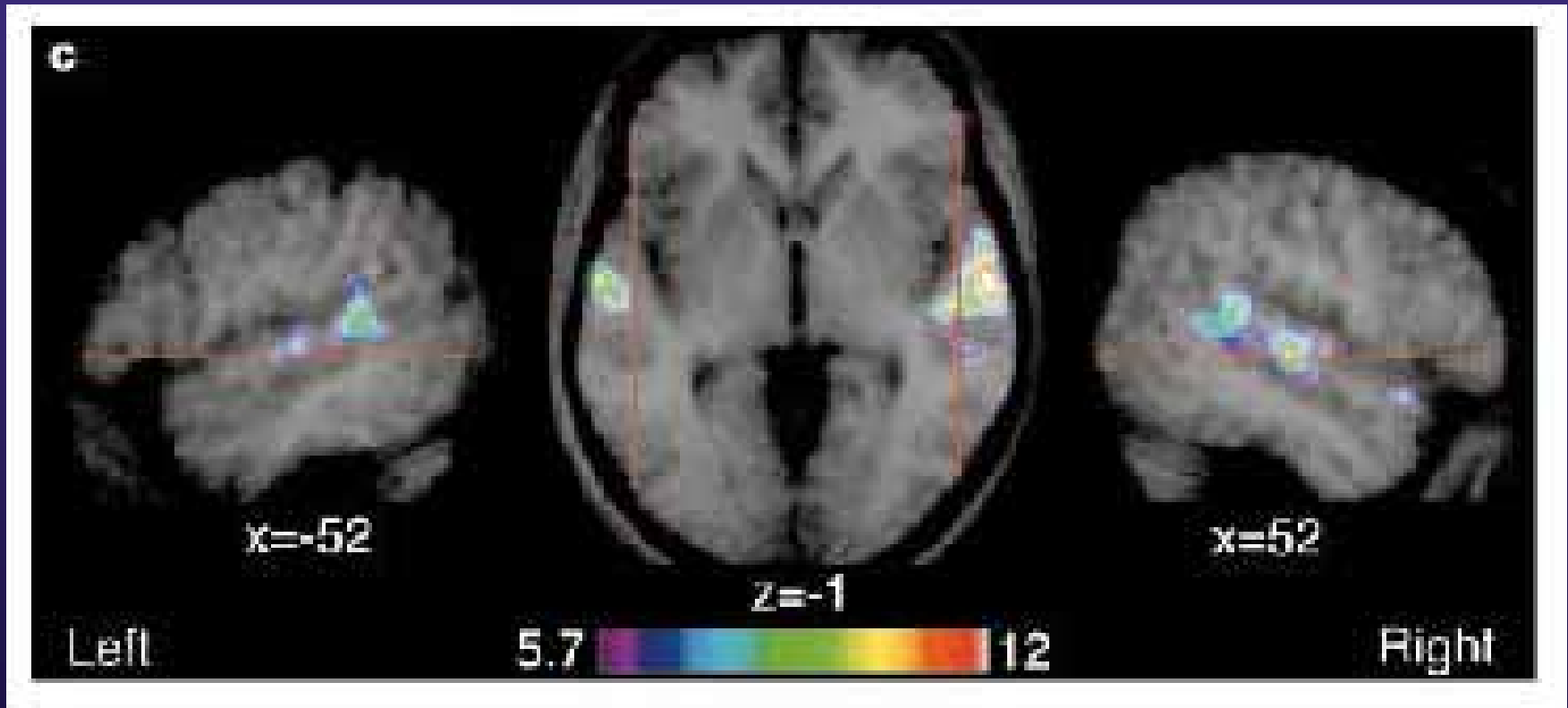
- Early Childhood  
1-3 years
  - Later Childhood  
3-10 years
  - Puberty  
8-14 years
  - Adolescence  
12-16 years
  - Early Adulthood  
15-30/40 years
  - Older Adulthood  
40-60 years
  - Senescence  
60-80+ years
- Often **overlap** between phases
  - Difference between **biological** age *versus* **chronological** age
  - Sex differences
  - Individual differences

# A continuum of vocal ability



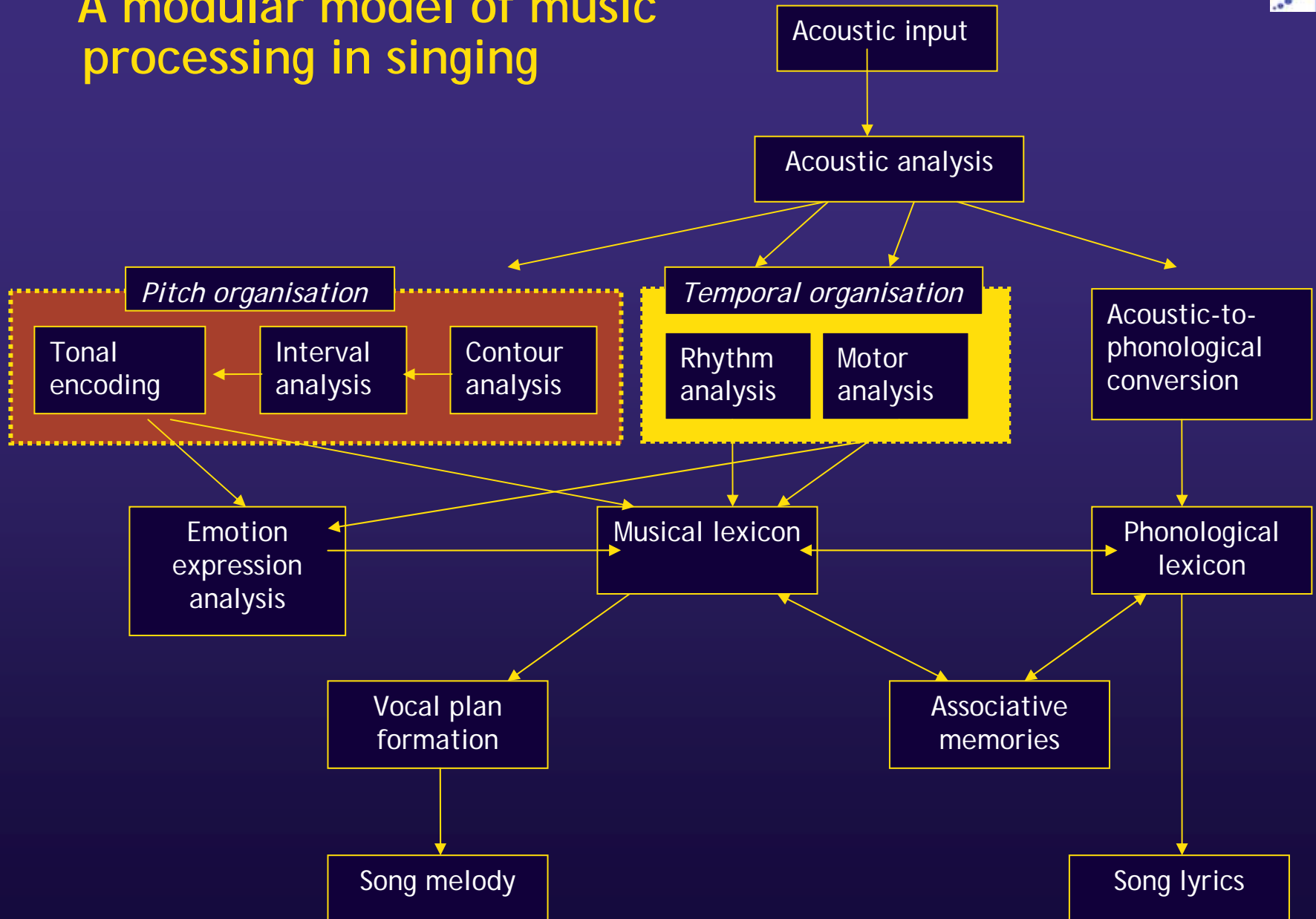
# Neuropsychobiological features

## Parts of the brain involved in the analyses of human voices



Belin *et al* (2000) Voice-selective areas in the human auditory cortex. *Nature*. 403: 309-312.

# A modular model of music processing in singing



## *Acoustic links*

Prosodic and melodic features of mother's voice (speaking & singing) are perceived *in utero*



foetus

## mother



Mother's emotional state when vocalising (speaking & singing) is 'encoded' hormonally in the filtered interfacing of the mother's and foetus' bloodstreams

## *Hormonal links*

Ontogenesis and development  
of voice is gendered, linked  
to female vocalisation and  
the symbiotic interweaving of  
singing and emotion

# Infancy

# Infancy summary

- In general, the first year of life is characterised by increasingly diverse vocal activity
- The first vocalisations of infancy communicate affective state: discomfort and distress, then also comfort and eustress
- Vocalisations expand to include quasi-melodic features (2-4 months), developing vocal control (4-7 months)
- Vocal pitch is directly linked to the prosodic features of the mother tongue

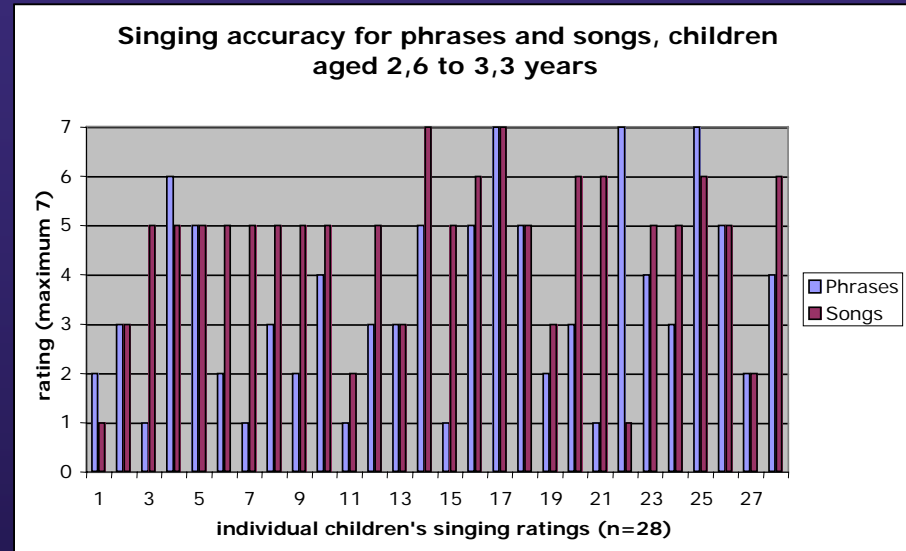
# Early Childhood

# Pre-school (1)

- 2-year-olds' repeat brief phrases with identifiable rhythmic and melodic contour patterns (Dowling, 1999)
- 3-year-olds' have vocal interplay between spontaneous improvisation and selected elements from the dominant song culture, termed '**pot-pourri**' songs (Moog, 1976)
- '**outline songs**' (Hargreaves, 1996)

# Pre-school (2)

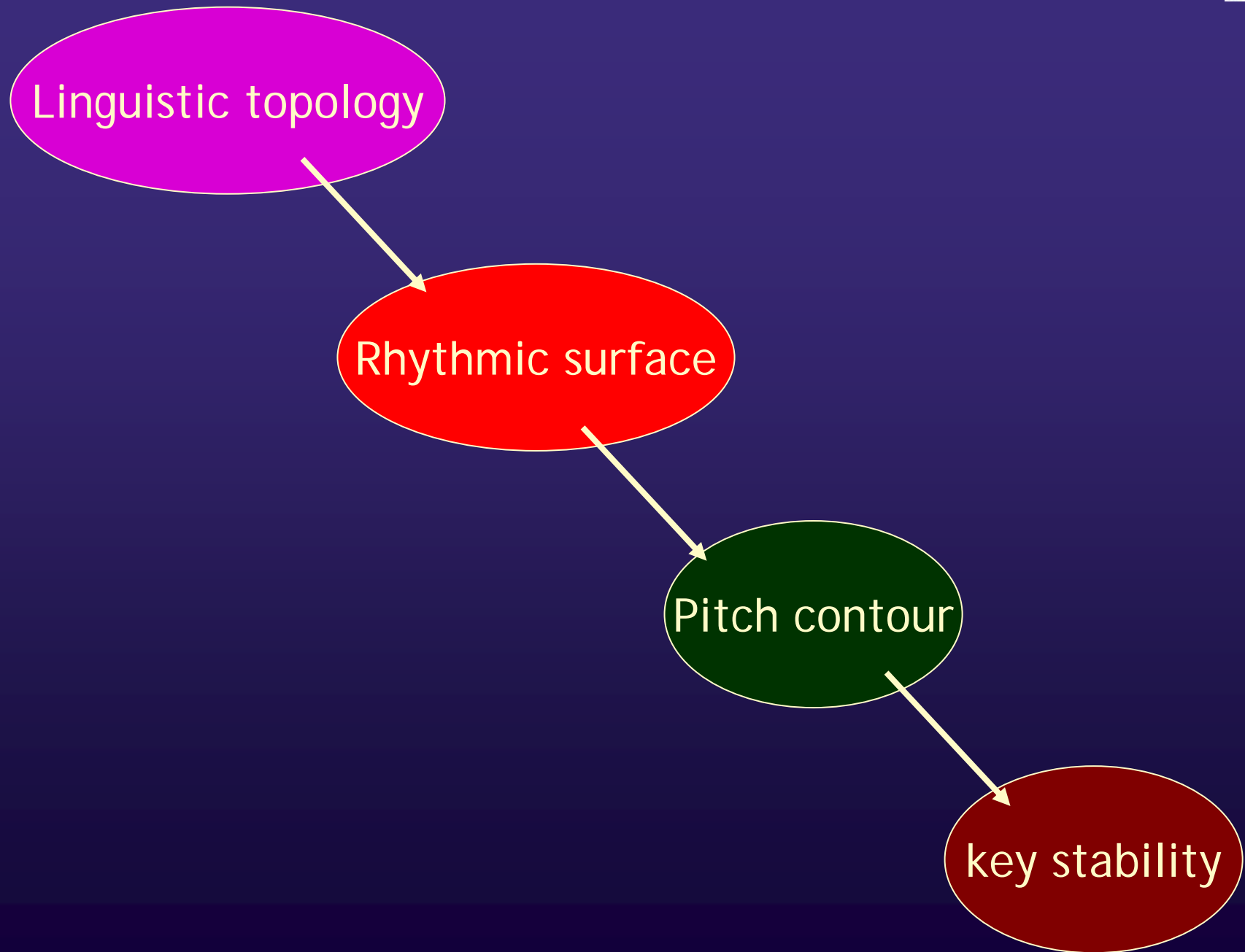
- However, the path of development is not necessarily linear for any particular individual
- USA study of spontaneous singing of two-year-olds' first songs - evidence that *'phrases are the initial musical units'* (Davidson, 1994, p117) with limited pitch range, a certain disjunction of key/tonality and a descending contour



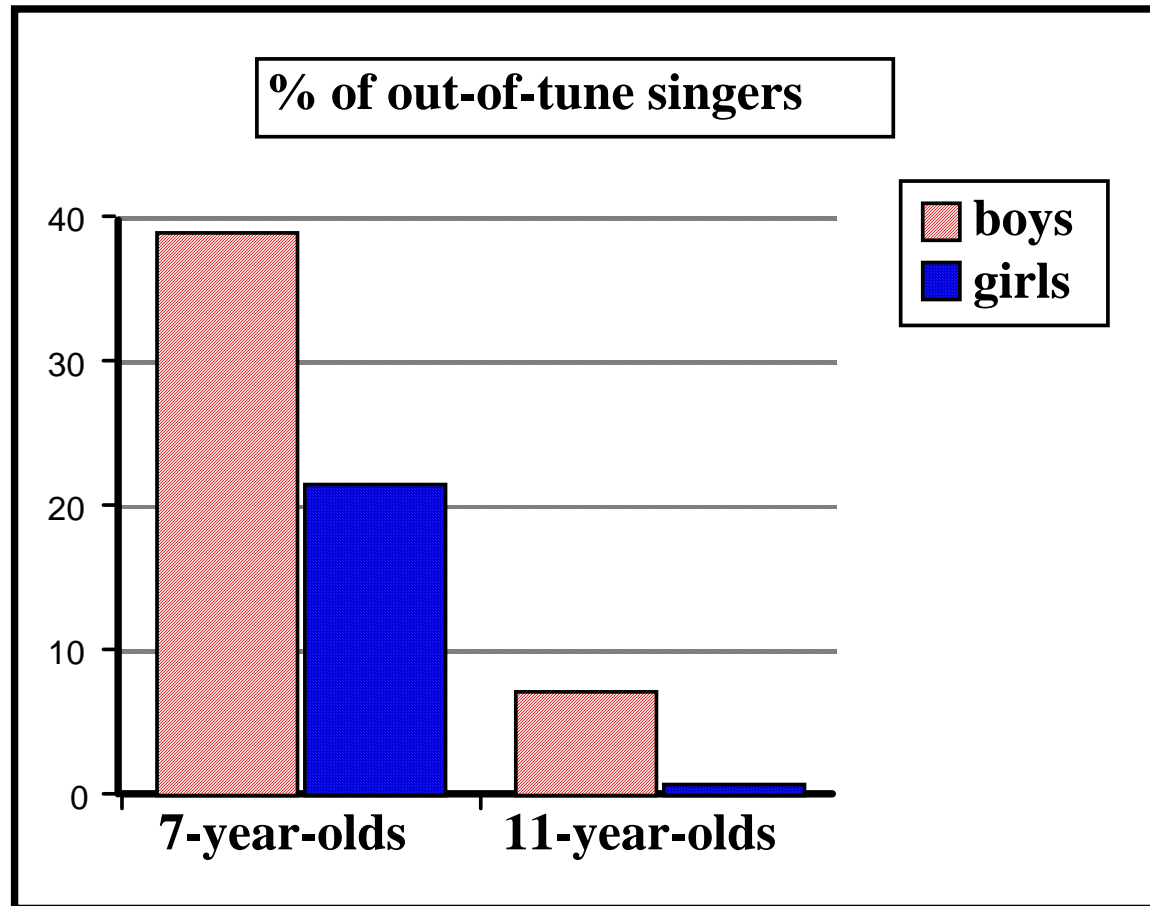
- New longitudinal Italian data of two- and three-year-olds reveals impact of rich singing environment from pre-birth
- Some children able to imitate complete songs modelled by their mothers

(Tafari & Welch *in* Welch, 2006)

# Childhood

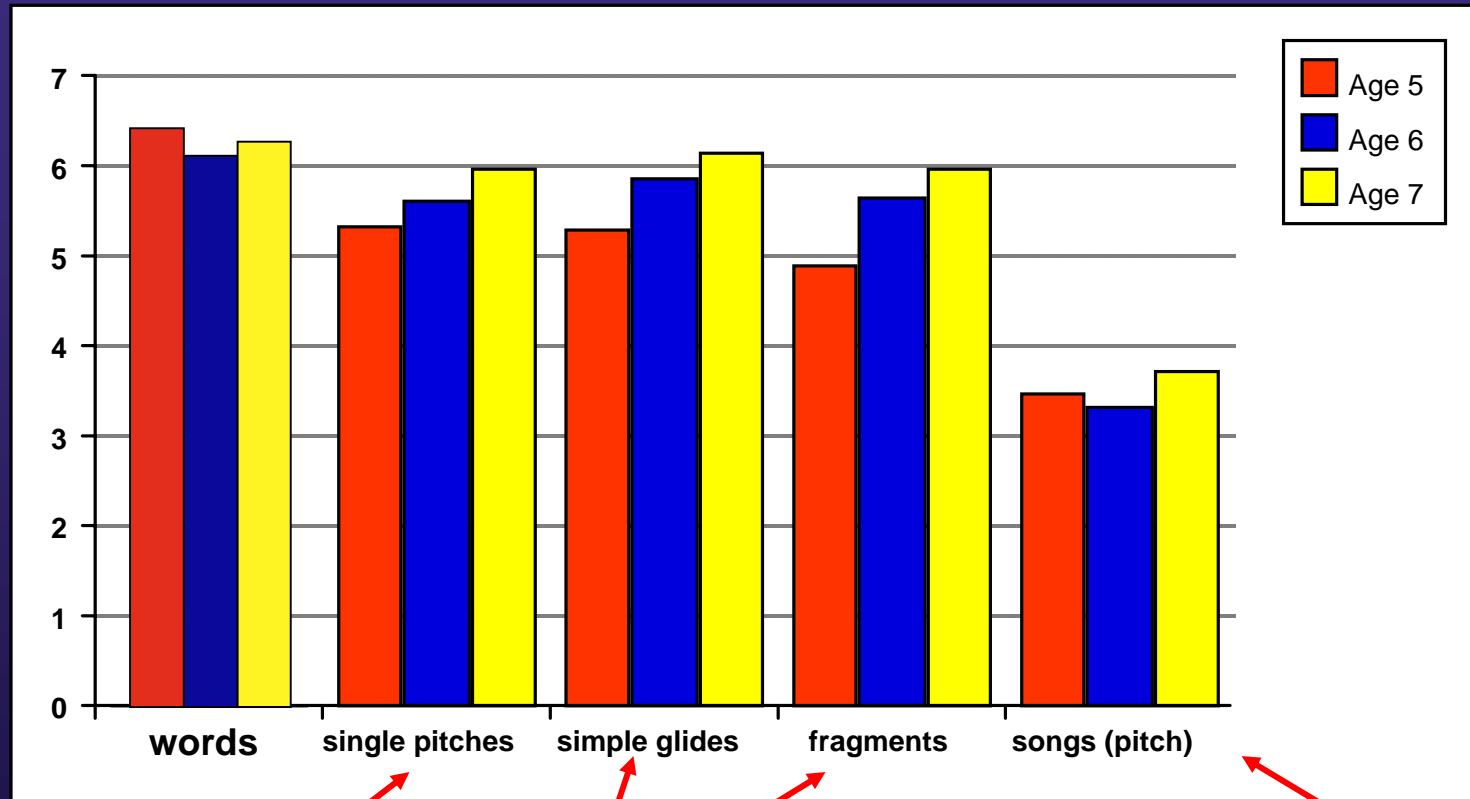


## Context



Literature: sex differences

# Three-year longitudinal research data n=184 (boys 87; girls 97)

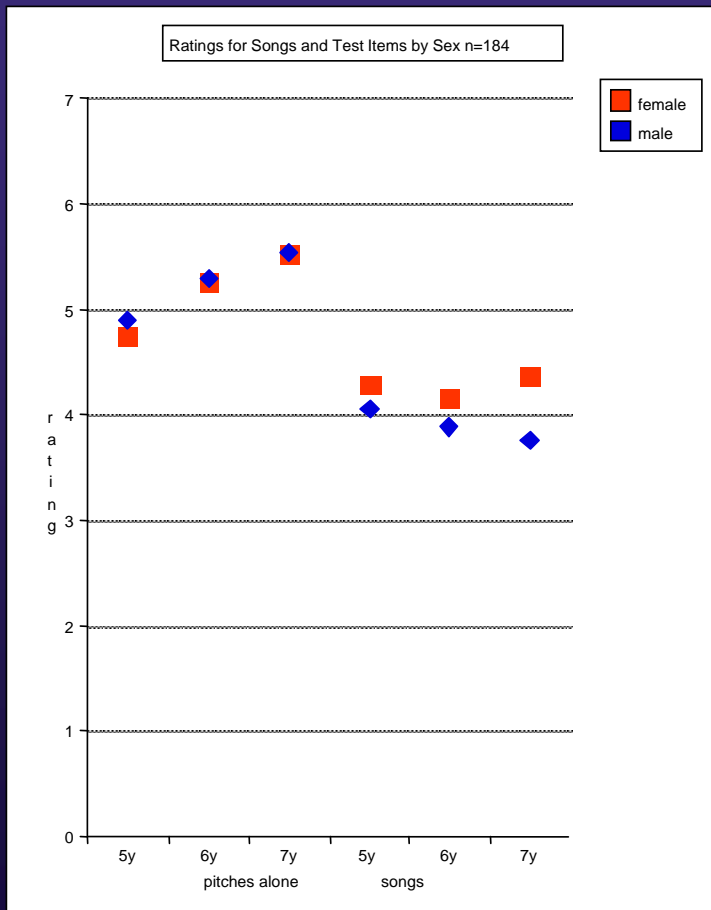


syntactic and communicative elements (the grammar of music)

structures (detecting/constructing patterns, regularities)

psycho-acoustic features (pitch, loudness, duration, timbre)

# Singing competence & context



- Observable singing competence is affected by:
  - Nature of the task (musical context)
  - Social Context (solo/group/location/culture)
  - Vocal health
- Competence embraces vocal pitch accuracy & vocal quality

(Buckton, 1982; Leighton & Lamont, 2006; Mang, 2003; Rinta & Welch, in press; Thurman & Welch, 2000; Welch, 2006; Young 2002)

(Leighton & Lamont, 2006)

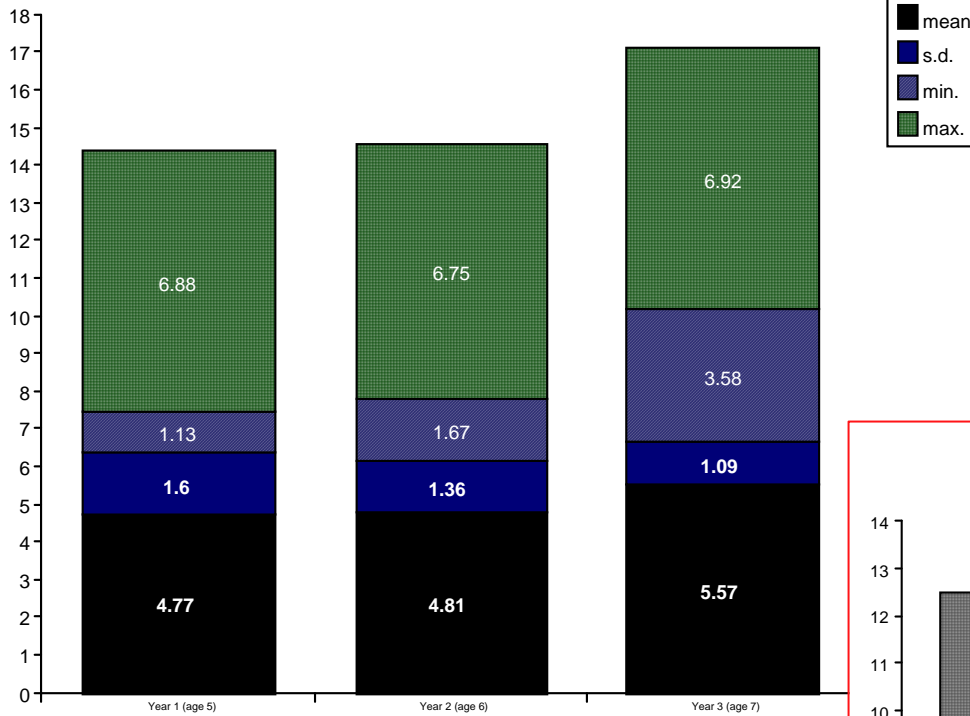
(Welch *et al*, 1996, 1997, 1998)

singing in-tune is:

relative

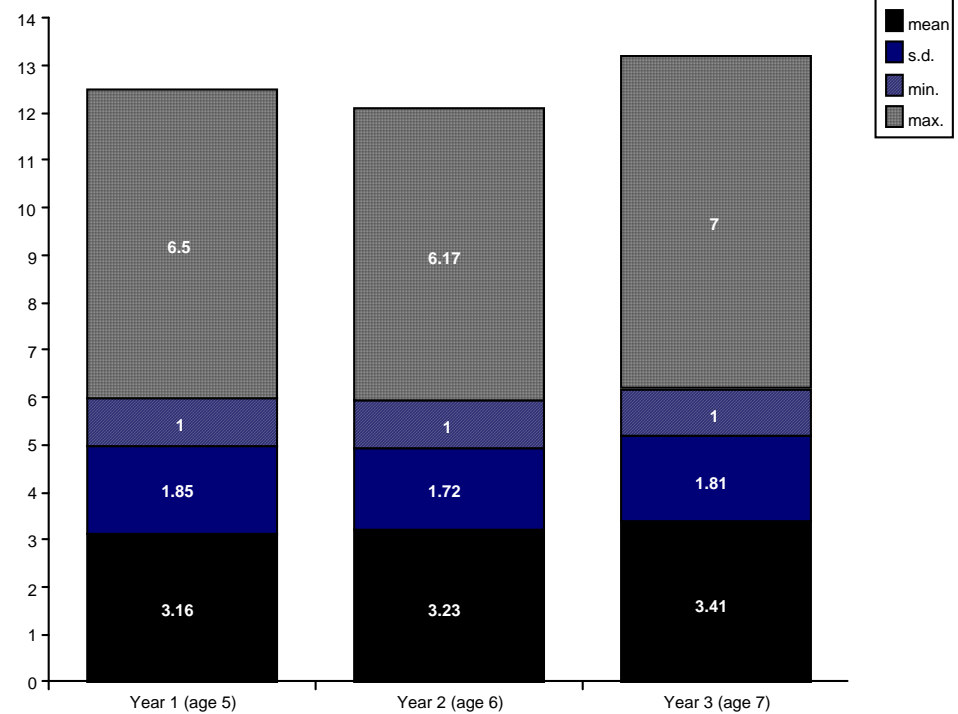
~~absolute~~

School 10: Song Performance for 2 Songs over 3 Years

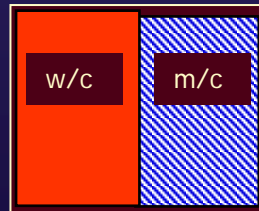


*School 10: same teacher across 3 years; keen interest in participation; emphasis on all children improving*

School 3: Song Performance for 2 Songs over 3 Years

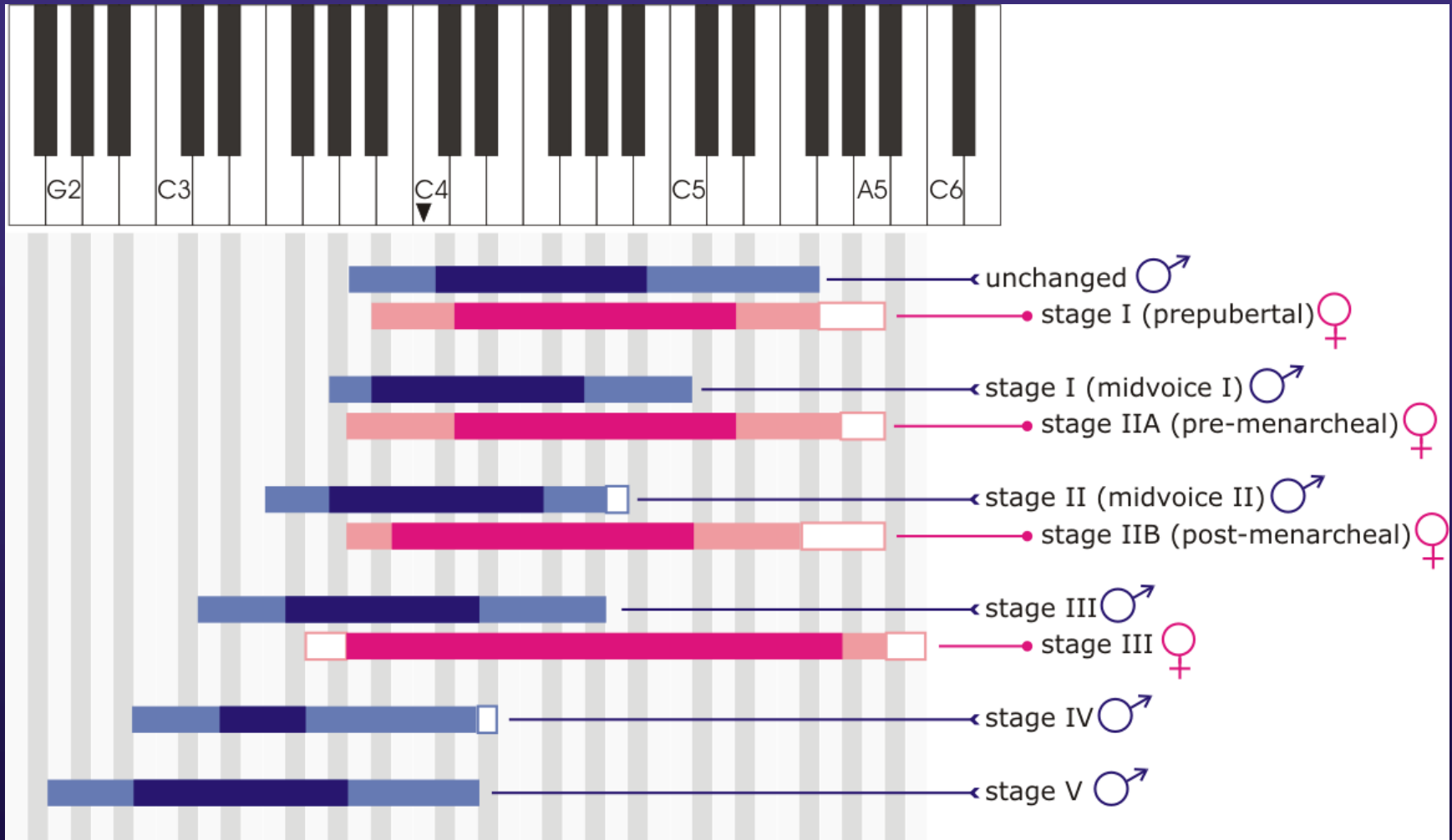


School effects

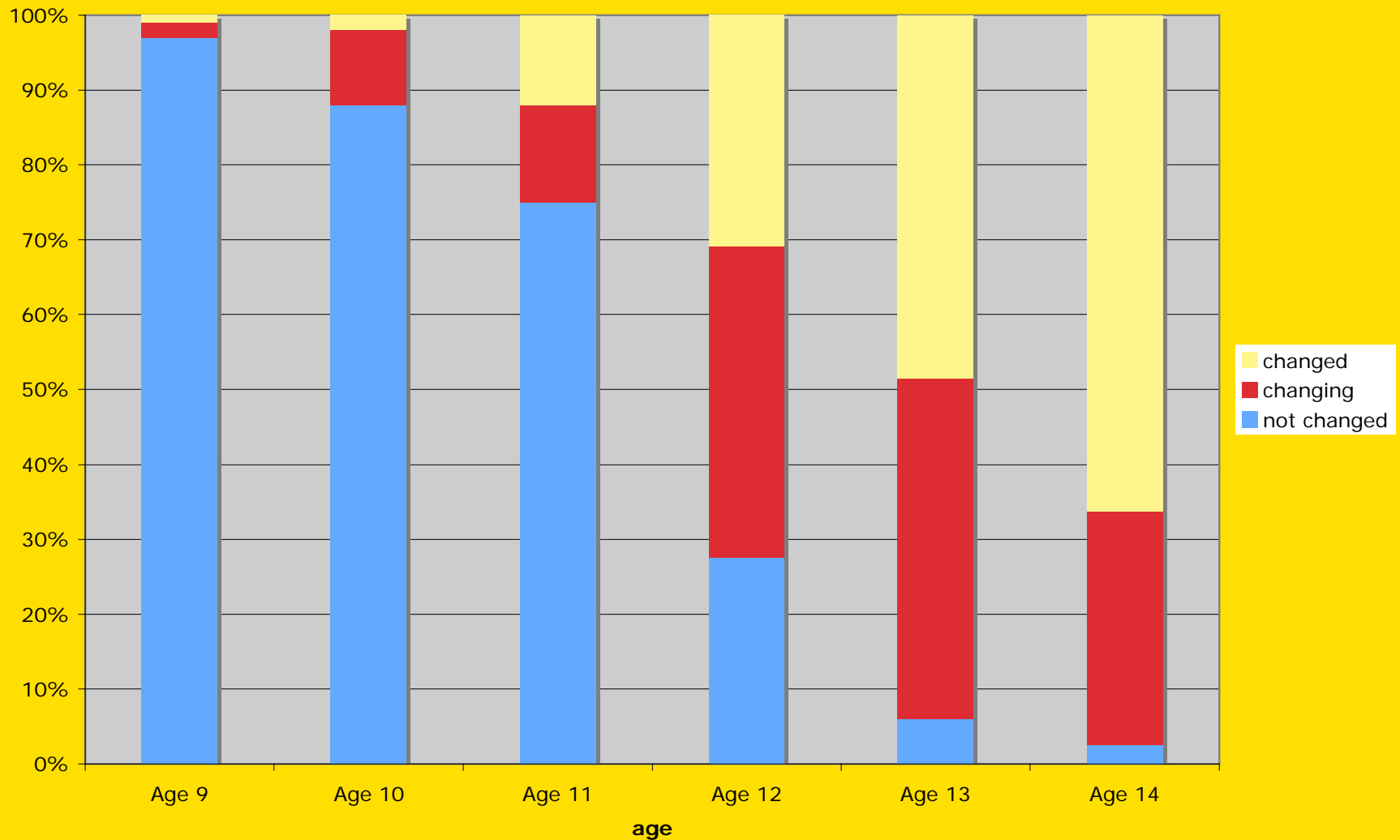


*School 3: less emphasis on all children improving*

# Adolescence



Stages of singing voice change for *females* (based on Gackle, 2000) and *males* (based on Cooksey, 2000)



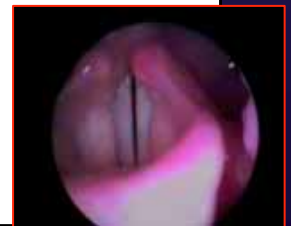
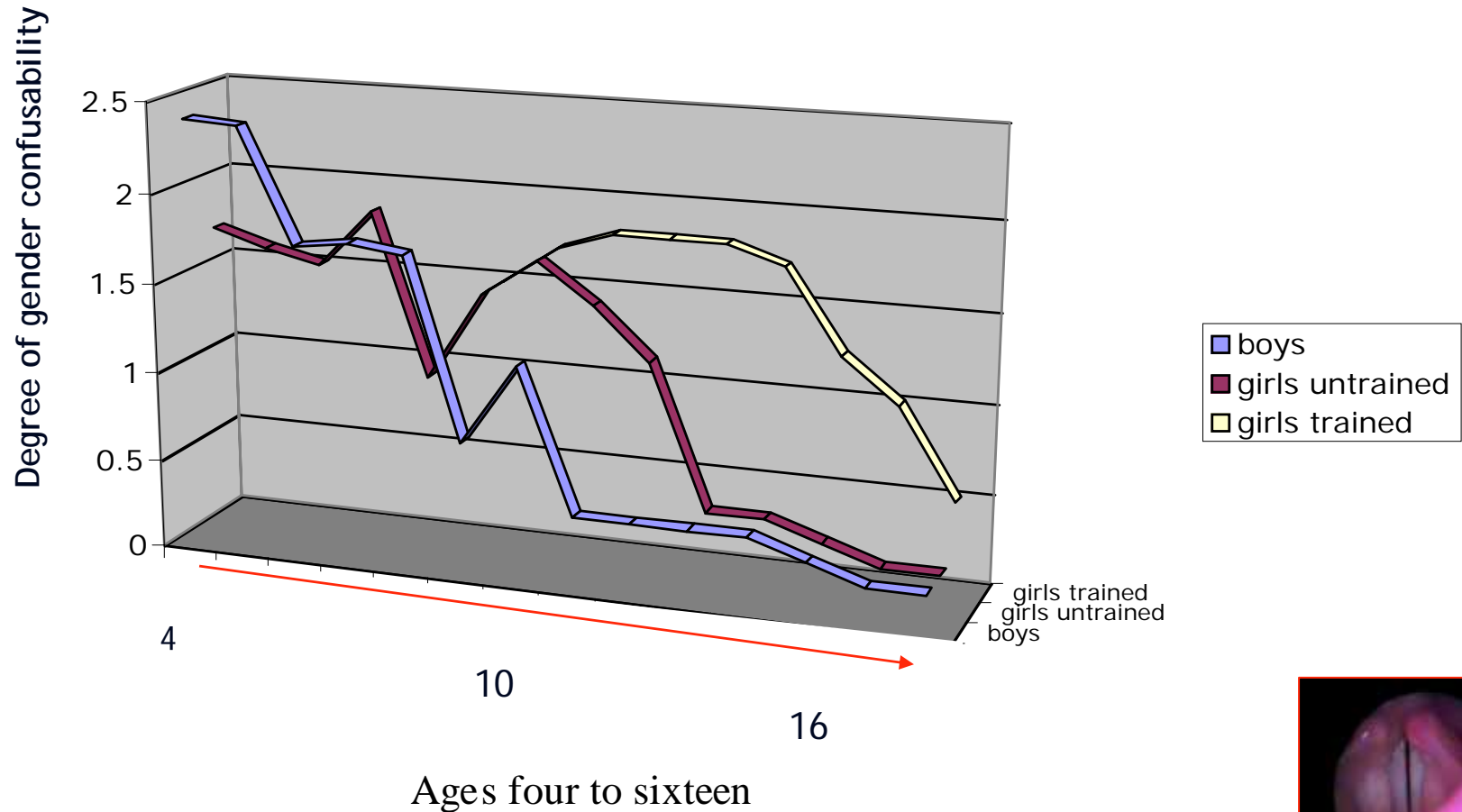
Extrapolated model of adolescent male voice change by age, based on UK (Geddye, 1997) and Japanese data (Norioka, 1994), total n=3,188

(Welch, 2006)

# Psychological

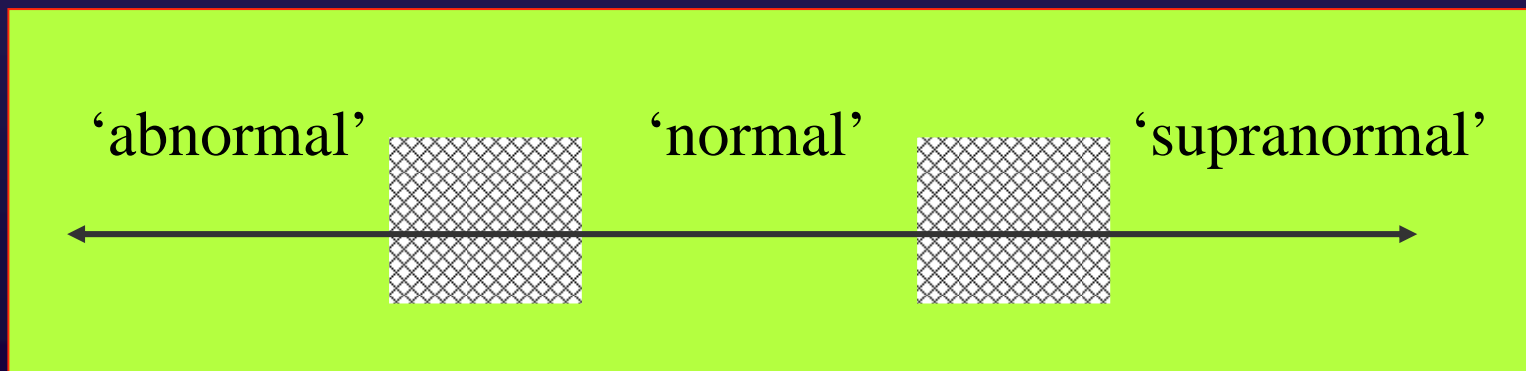
- Young boys are often confused as girls
- Older boys and girls nearly always identified correctly
- But trained girls can be confused as boys

## Singing confusability by age and gender



# Positive and Negative Identities

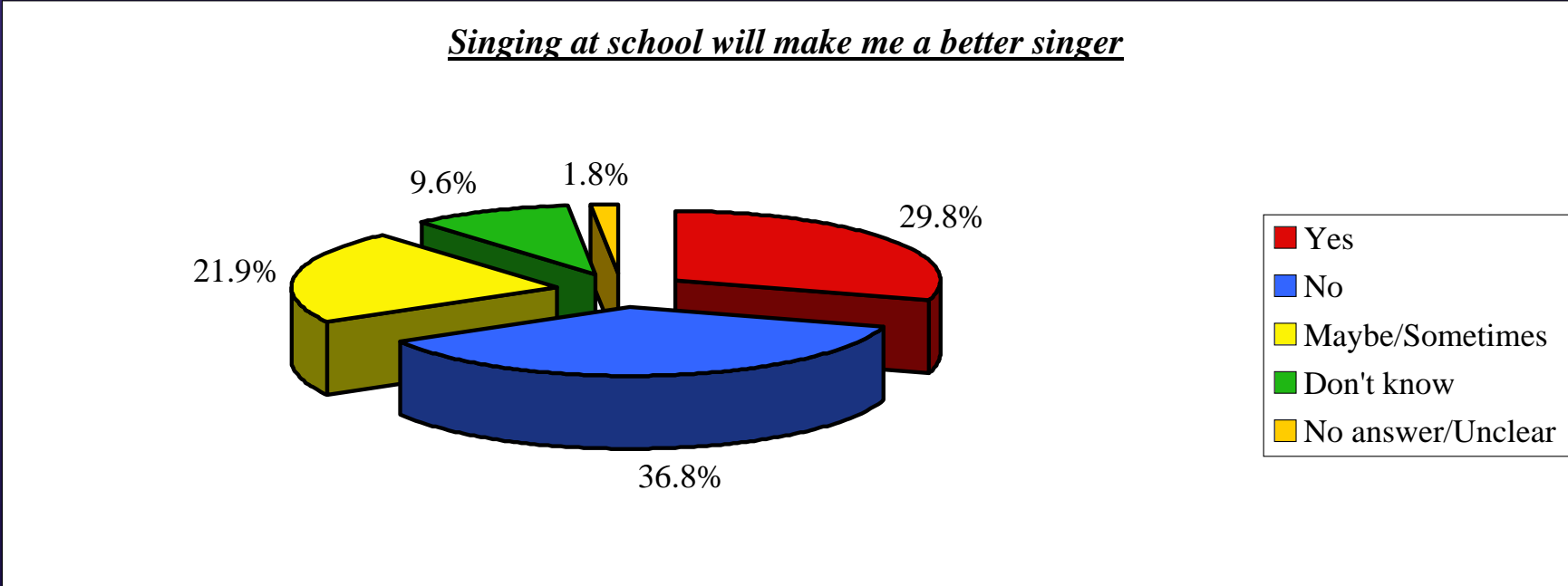
- *Intrapersonal* communication can be:
  - Positive
    - Example: deliberate practice for performance expertise (Lehmann, 1997); voice training for well-being (Wiens *et al*, 2002)
  - Negative
    - Example: 'I am a non-singer' (Welch, 2001)



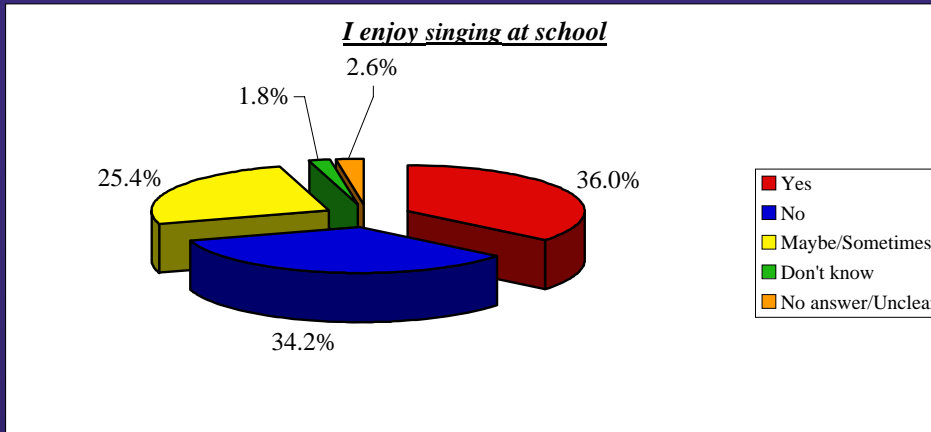
# Attitudes to singing in school and outside school

# Less than 1:3 believe that singing at school will make them a better singer

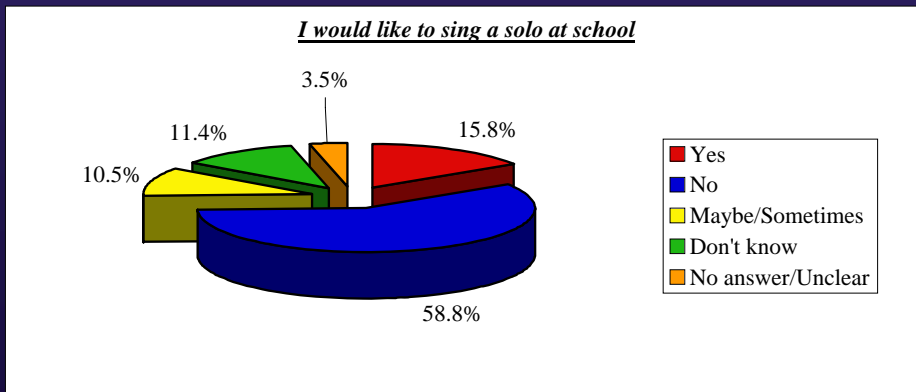
Joyce (2005)



Data from ten-year-olds in three primary schools in inner London



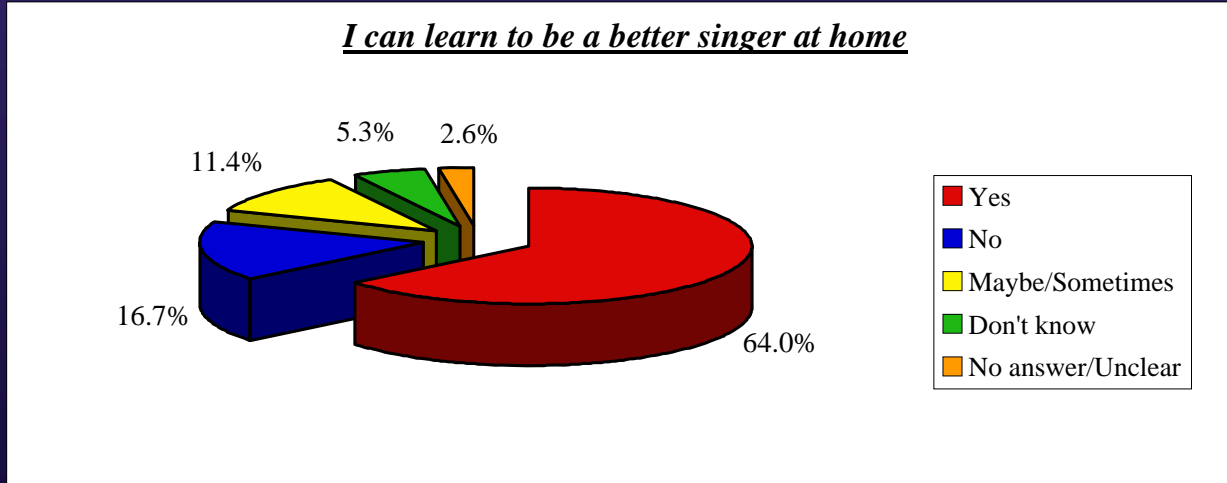
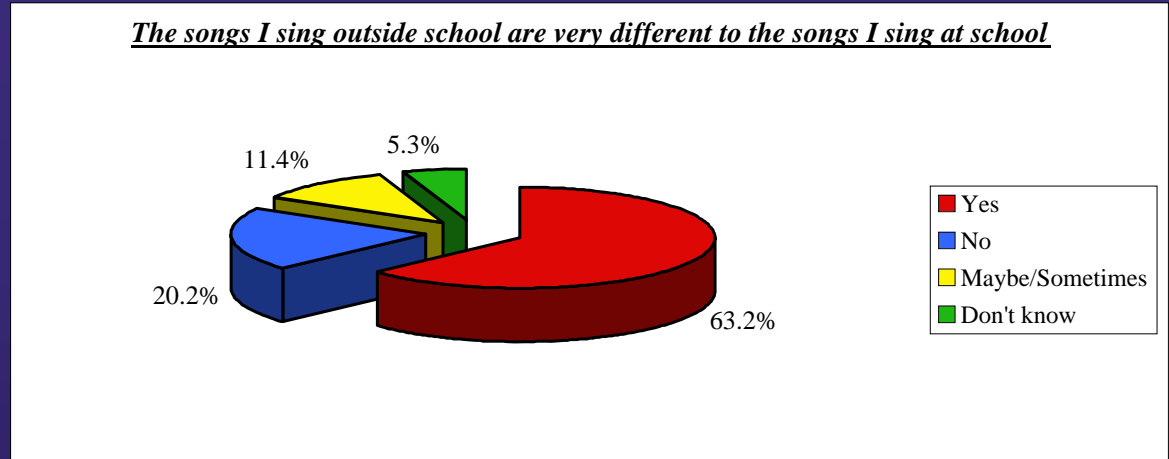
Only 1/3 enjoy singing at school (girls > boys)



Would you like to sing solo?  
4:1 = 'No'

# What about singing outside school?

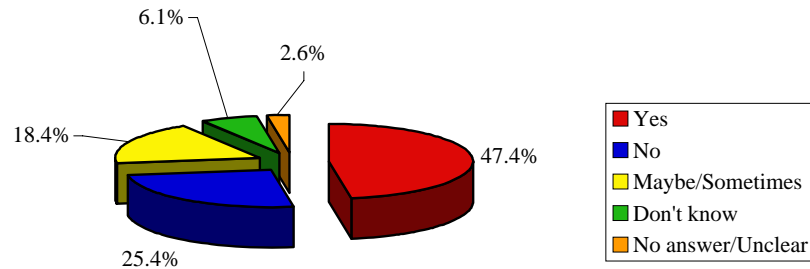
2:3 'Yes'



2:3 'Yes'

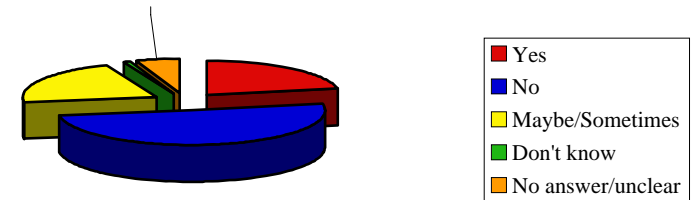
And similar proportion (2:3) 'Yes ... I enjoy singing at home'  
 boys = girls

*Singing is something everyone can do*



Can everyone sing?  
Less than 50%  
definitely agree

*My friends teach me songs*



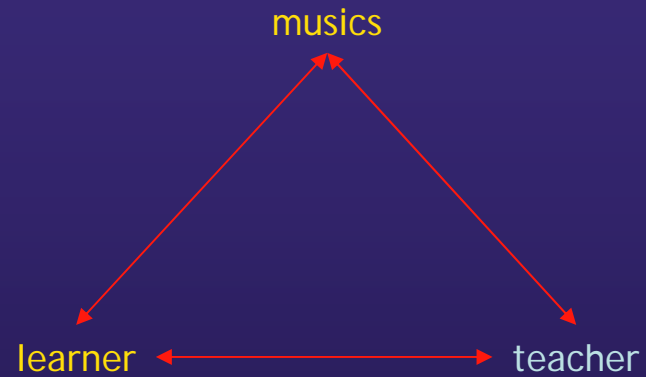
Do your friends teach you songs?  
boys 'No' 66.7%  
girls 'No' 35.1%

**Other findings:**

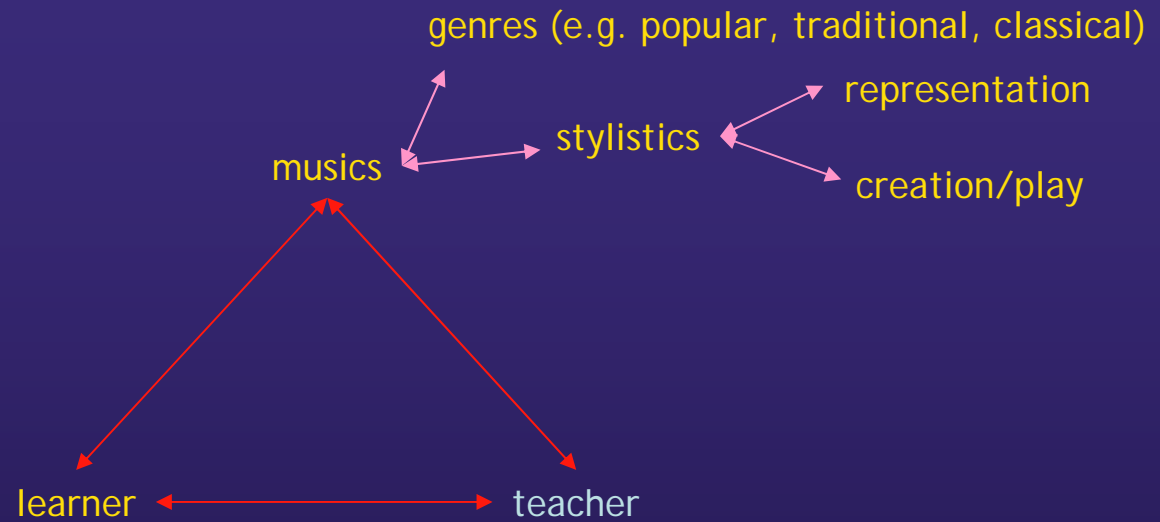
- less than half (43%) think that they have a 'good singing voice'
- few males consider themselves to be the 'best singer in class'
- 2/3 of pupils think that 'singing is a talent'
- boys less likely to be told by a family member that they are a 'good singer'

# Fostering singing development

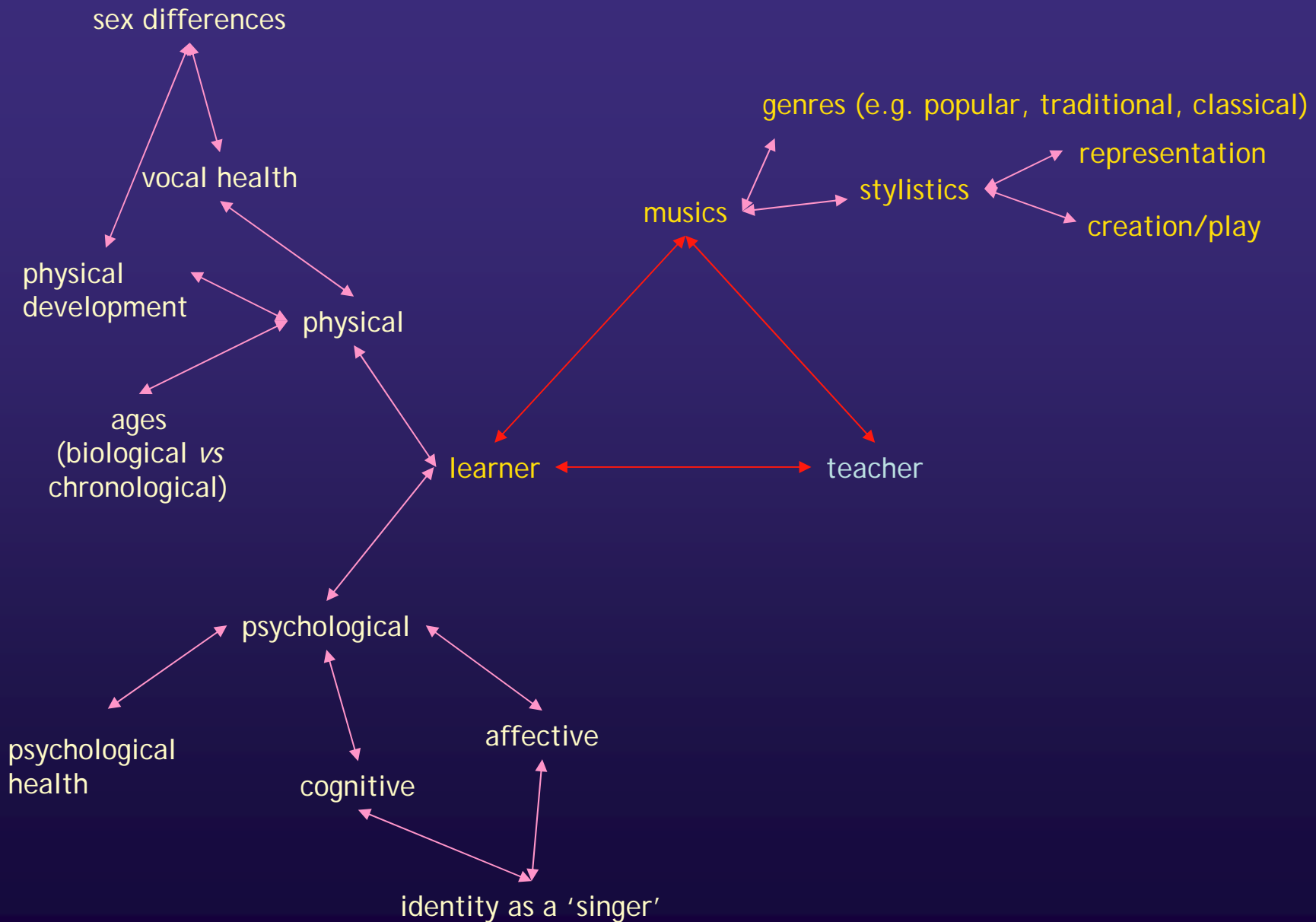
# Factors in enabling singing development



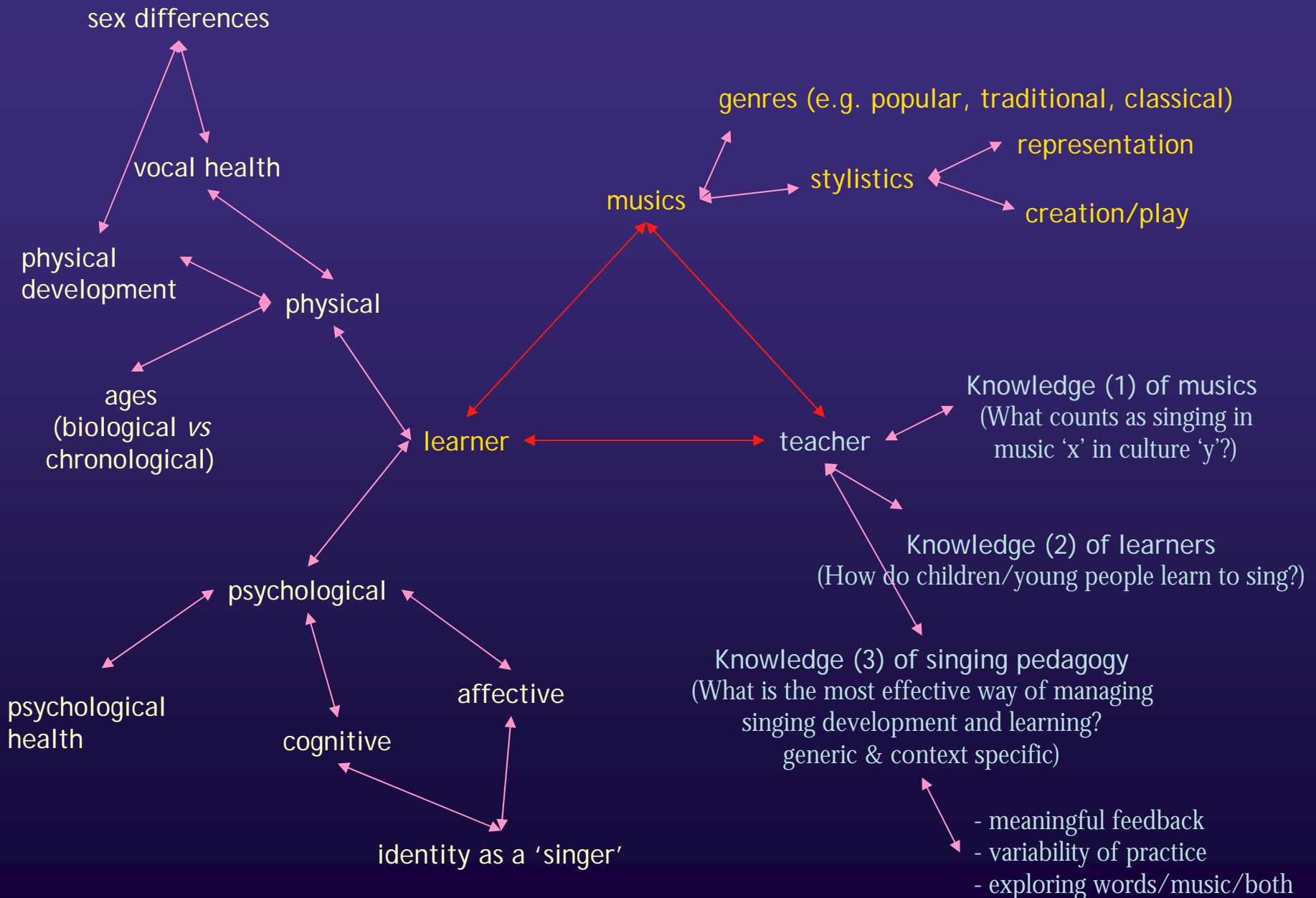
# Factors in enabling singing development



# Factors in enabling singing development



# Factors in enabling singing development



# Indicative References

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# Current/recent *voice research projects*

## *Externally funded research:*

- The application of technology to singing pedagogy (AHRB/Howard, Welch, Himonides & Brereton)
- The female chorister voice (AHRB/Welch & Howard)
- The teaching of singing performance in the postgraduate studio (ESRC/Welch et al)

## *Current PhD Projects:*

- The perception of beauty in vocal performance (Himonides)
- Vocal health in the professional boy chorister (Williams)
- Gender and singing in the English cathedral context (Stewart)
- Dyslexia and performance (singing) (Bishop-Leibler)
- The choral conductor (Litman)
- The use of singing activities in the treatment of children's voice disorders (Rinta)
- Children's choral singing development and the conductor (Varvarigou)
- Traditional Chinese music and music education (Yang)
- Female singing behaviour in contemporary music theatre (Kayes)
- South Asian and Western classical singing styles and contexts (Grimmer)
- Singing identity in older 'non-singers' (Knight)

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