

# SOCIALITY & COMMUNICATION IN NONHUMAN PRIMATES

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## Outline

- Primate social organization
- Determinants of Pso
- Communication
  - Vocal repertoire
  - Primate songs

## SOCIAL ORGANIZATION IN PRIMATES

(Kappeler & van Schaik, 2002)

## Social Organization in Primates

Considerable interspecific variation in social group composition among primates but...

...There is very little variability within each species.

- Six basic patterns.

## Social Organization in Primates

Solitary primates

Primates in pairs

Group-Living Primates

## Social Organization in Primates

Single female and her offspring  
 Monogamous family group  
 Polyandrous family group

One-male-several-female group  
 Multi-male/multi-female group  
 Fission-fusion society

### Single female and her offspring

The single female and her offspring group pattern is rare for primates but common for other mammals. It is found among the orangutans and some nocturnal prosimians. The adult males lives mostly alone.

They come together with females occasionally for mating. The males of these species generally have large territories that overlap those of several females. Children usually leave their mother when they reach sexual maturity.

### Monogamous Family Group

Monogamous groups consist of an adult male and female with their children. While this group pattern is the most common one for humans, it is rare for non-human primates. It is found among the small Asian apes as well as some of the New World monkeys and prosimians.

Specifically, monogamous family groups are the common pattern for gibbons, siamangs, titi monkeys, indris, tarsiers. When they are grown, the children usually leave to create their own families.

### Polyandrous Family Group

The smallest New World monkeys, the marmosets and tamarins, form both monogamous and polyandrous family units. They generally start with a monogamous mating pair. Later, a second adult male may join the family and assist in child rearing. When this occurs, both adult males will potentially mate with the adult female

This polyandrous mating pattern is extremely rare among non-human primates but does occur in some human societies in isolated rural regions of India, Sri Lanka, and especially Nepal, and Tibet.

### One-Male-Several-Female Group

One-male-several-female groups have polygynous mating patterns where one male regularly mates with more than one female. This pattern is found among hamadryas baboons, geladas, langurs, howler monkeys, gorillas and many human societies.

It has been a culturally preferred marriage pattern in numerous Native American, African, and South Asian cultures. It would be a mistake to automatically assume that non-human primate one-male-several-female groups are dominated by males. Among geladas, females largely control the social group. This is despite the fact that the males are larger, stronger, and more aggressive. Mothers, sisters, and aunts act as a team in chasing off other unrelated females.

### One-Male-Several-Female Group

One-male-several female groups may take a different form when predator pressure is a problem. In open grasslands, hamadryas baboon communities are much larger, often consisting of a number of polygynous families.

In such multiple one-male-several-female group societies, males are the dominant, controlling members. The adult males not only "herd" their own sexually mature females, but also maintain order and protect the community from predators. In contrast, gorillas rarely have to be concerned about predator dangers. Subsequently, their communities usually consist of a single dominant adult male, his mates, and their children. When males reach maturity, they usually are driven off by the dominant silverback male.

### Multi-male/Multi-female Group

The most common social group pattern among semi-terrestrial primates is the multimale/multifemale group. With this pattern, there are no stable heterosexual bonds-both males and females have a number of different mates. This is characteristic of savanna baboons, macaques, as well as some colobus and New World monkey species. Multimale-multifemale groups commonly have a dominance hierarchy among both males and females. Each individual is ranked relative to all other community members of the same gender.

This type of hierarchy tends to reduce serious violence within the community since everyone knows in advance who they must defer to and who must be submissive to them. Among rhesus macaques, one's position in the dominance hierarchy is determined by the rank of his or her mother.

## Fission-Fusion Society

A fission-fusion society is one in which the social group size and composition change throughout the year with different activities and situations. This is the social pattern typical of chimpanzees. Individuals enter and leave communities from time to time. Adult males occasionally wander off and forage alone or join a few other males in a hunting party. Females casually change membership from one group to the other. This occurs especially when females are in estrus and seeking mates. As a result, foraging and sleeping groups reform frequently.

Male chimps are the relatively stable core of the community since they rarely join other troops. What allows for the generally loose relationship between chimpanzee communities is that they apparently recognize a wider range of social bonds than do monkeys. Group composition of some langur and baboon species also change as a result of the availability of food and mates. Evidently, none of these monkey species change group composition with the ease and frequency of chimpanzees. As a result, their societies are not usually referred to as fission-fusion types.

## DETERMINANTS OF PRIMATE SOCIAL ORGANIZATION

(Kappeler, 1997)

## DETERMINANTS OF PSO

According to current theories of primate social organization, ecological pressures in the broadest sense, including the distribution of both risks and resources in the environment, determine the distribution of females (van Schaik, 1989).

This initial focus on females is justified because female reproductive success is primarily constrained by ecological factors, such as access to food, whereas male reproductive success is primarily limited by access to females (Trivers, 1972; Emlen & Oring, 1977).

## DETERMINANTS OF PSO

Males then compete among themselves to map their distribution on that of females, generating a particular type of social organization (van Schaik, 1989).

## DETERMINANTS OF PSO

Predation risk and resource competition have emerged as the two most important ecological factors influencing female spacing (van Schaik, 1989).

## PREDATION RISK

Both solitary and group life can be interpreted as individual behavioural strategies to minimize predation risk, because solitary and group-living primates are faced with predators that rely on different hunting techniques (Terborgh & Janson, 1986).

Among primates, being solitary is mostly synonymous with being small and nocturnal.

## PREDATION RISK

Except for the orang-utan, which is probably largely immune from predation because of its size, diurnal primates live in groups. Life in permanent groups offers several potential advantages that reduce the individual risk of predation (Cheney & Wrangham, 1987; van Schaik & van Noordwijk, 1989).

## PREDATION RISK

Although groups are more easily detected by predators, additional eyes and ears contribute towards improved detection of predators.

Moreover, vigilance can be shared among group members and individual predation risk may decrease as a result of the dilution effect created by group life. Several members of a group may also be able to defend themselves successfully against a predator.

## FEEDING COMPETITION

Provides less convincing explanation when considered solely.

Large groups may memorize food locations better than individuals but:

- Primate groups move non randomly.
- They do not always have large home ranges.
- Rare food calls.
- Inter- vs intra-group feeding competition.

## GROUP COMPOSITION

The number of males per group is apparently unrelated to interspecific differences in predation pressure, as far as their potential role in predator deterrence and protection is concerned (Cheney & Wrangham, 1987).

Males may contribute importantly to predator detection, however (van Schaik & van Noordwijk, 1989).

## GROUP COMPOSITION

Evidence for male participation in intergroup competition for resources is rare; males primarily attack non-resident males (Cheney, 1987).

Instead, the number of males per group increases with the number of females and their defensibility (Ridley, 1986; Altmann, 1990).

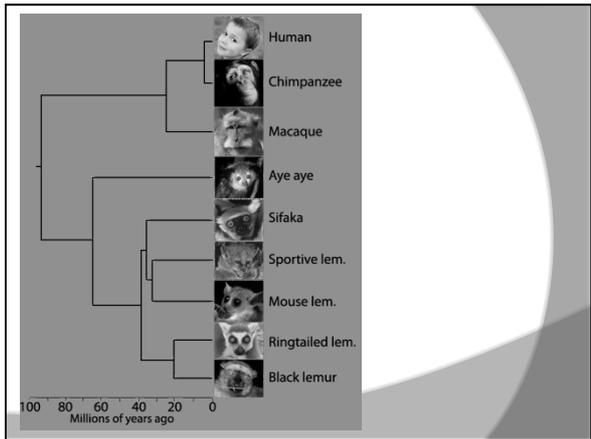
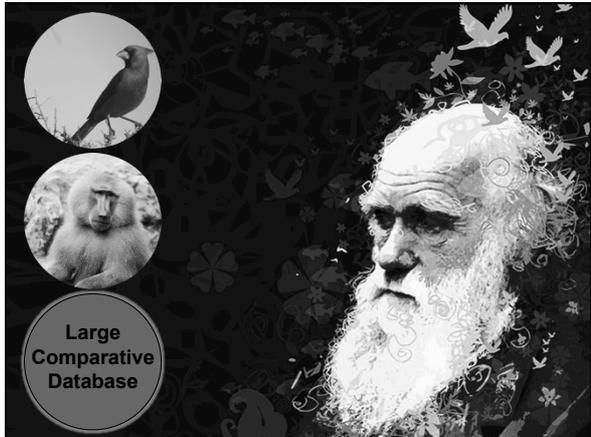
Defensibility of females is primarily determined by the degree of synchrony of their receptive periods (Dunbar, 1988).

## SOCIALITY AND COMMUNICATION

Understanding the rules that link communication and social behavior is an essential prerequisite for discerning how a communication system have evolved.

### SOCIALITY AND COMMUNICATION

The comparative method offers a powerful tool for investigating the nature of these rules, since it provides a means to examine relationships between changes in communication abilities and changes in key aspects of social behavior over evolutionary time.

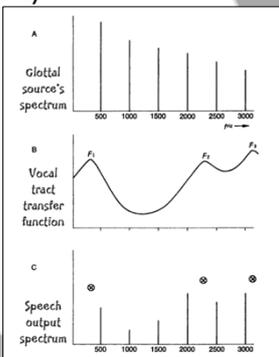


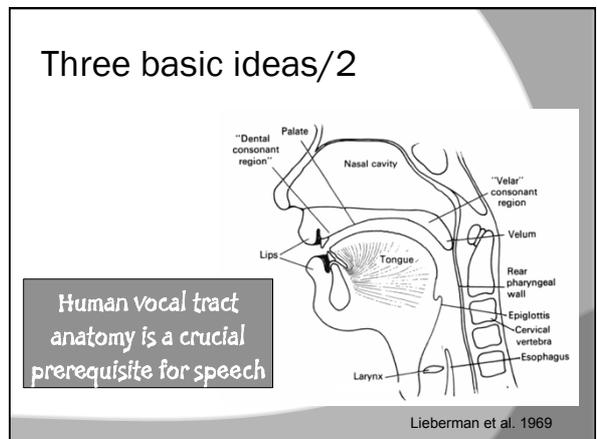
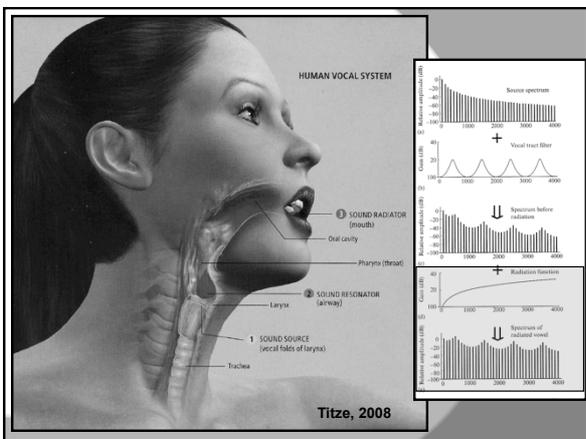
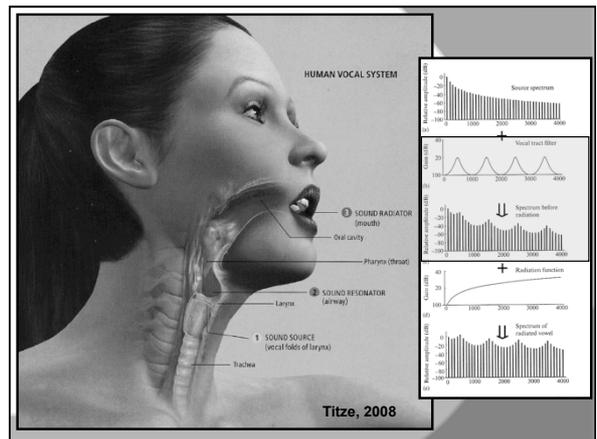
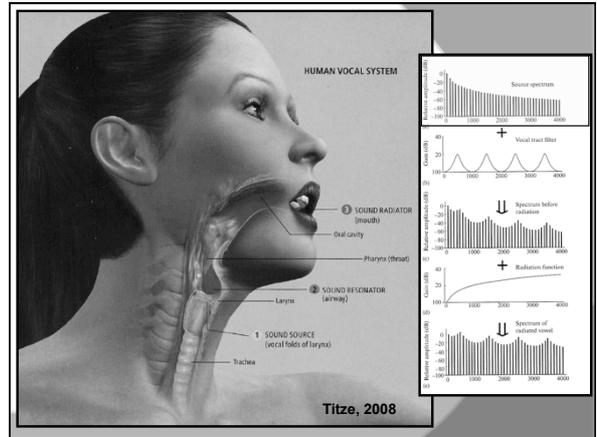
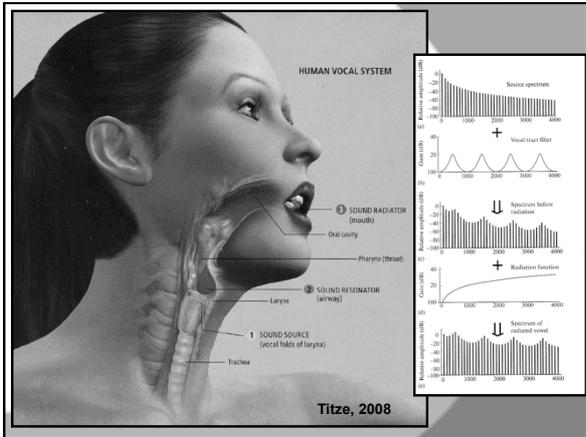
### Human phonation



### Three basic ideas/1

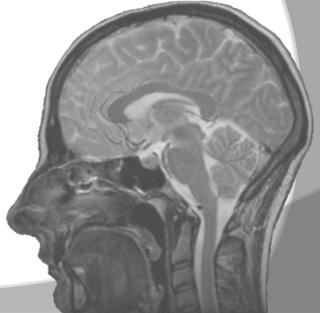
The Source-Filter Theory of Speech (Fant, 1960)



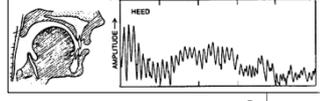
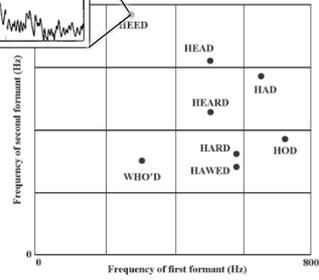


Three basic ideas/3

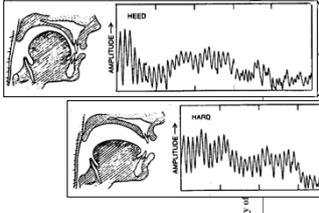
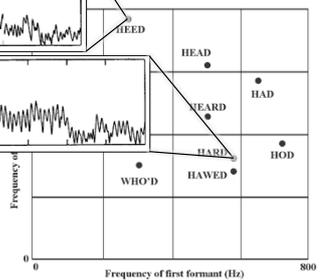
Greater variety of vocal tract shapes  
 V  
 Greater variety of sounds



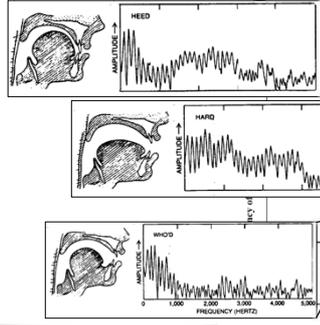
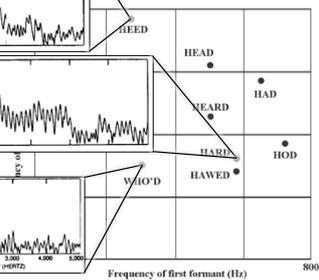
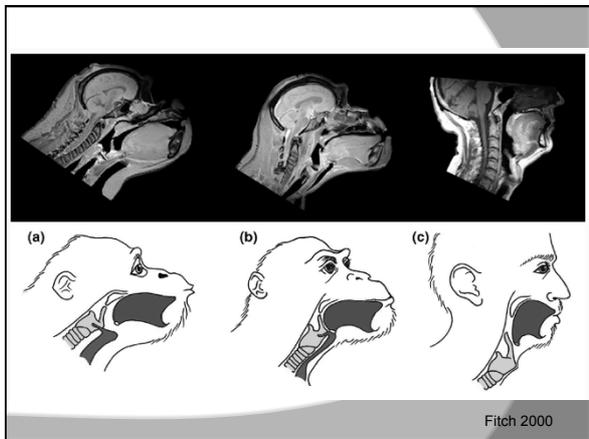
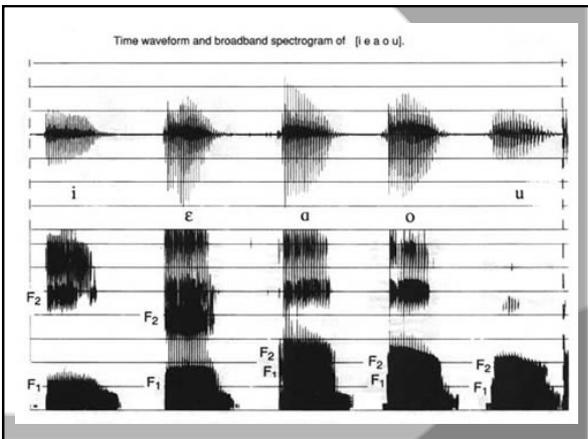
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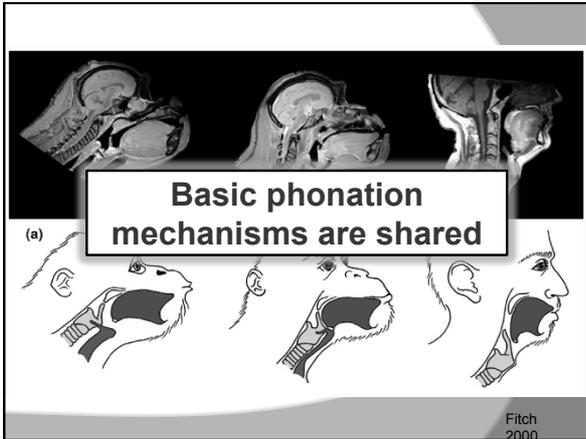



English vowel sounds and vocal tract configurations

English vowel sounds and vocal tract configurations

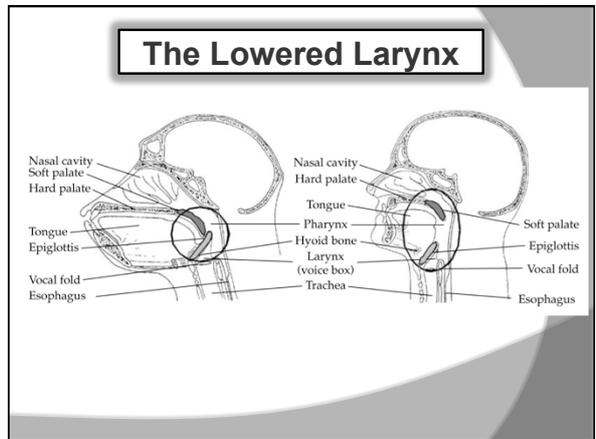
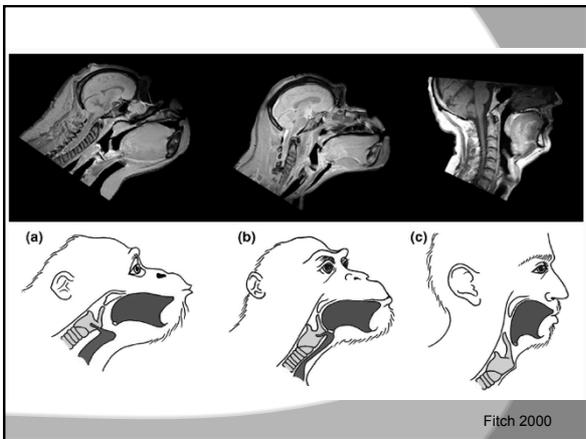
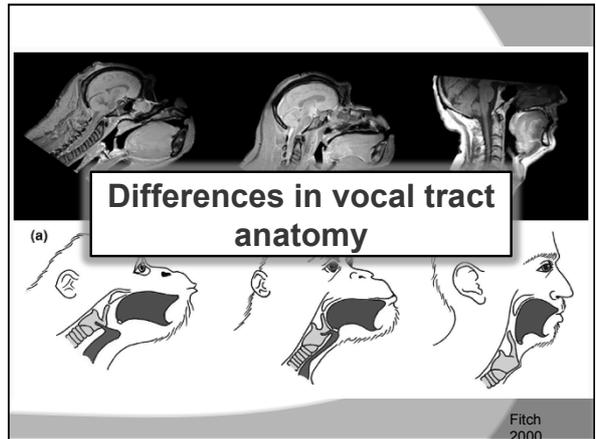




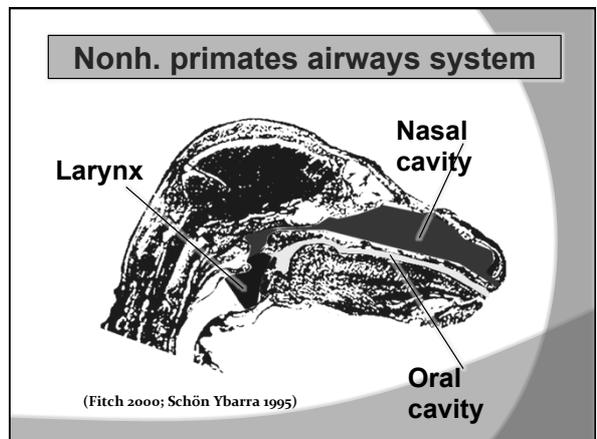
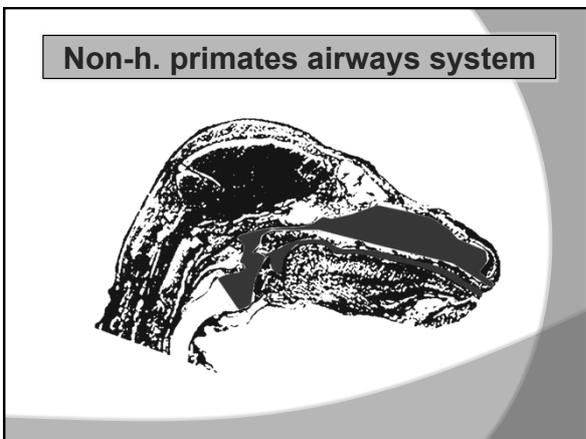
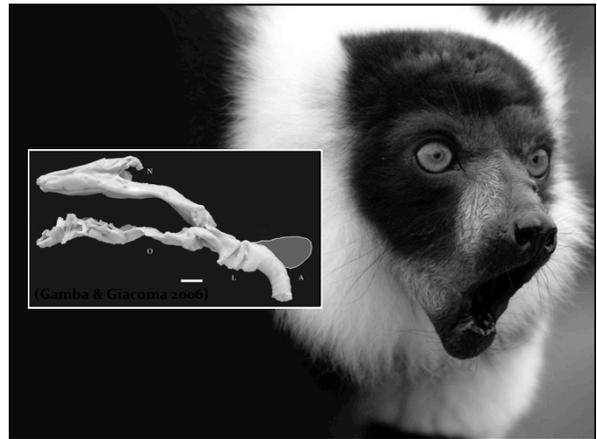
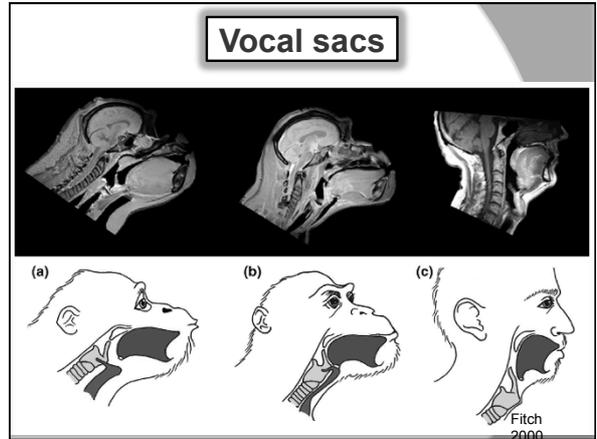
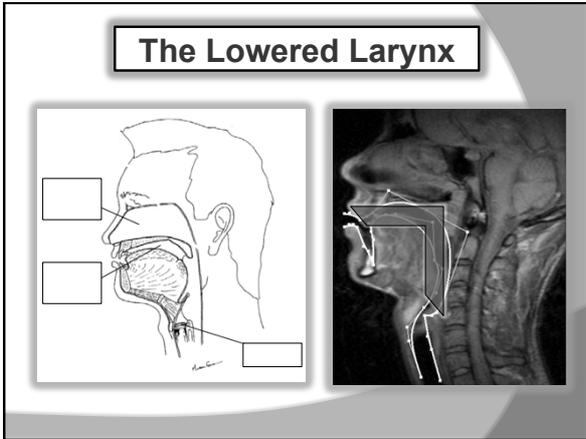


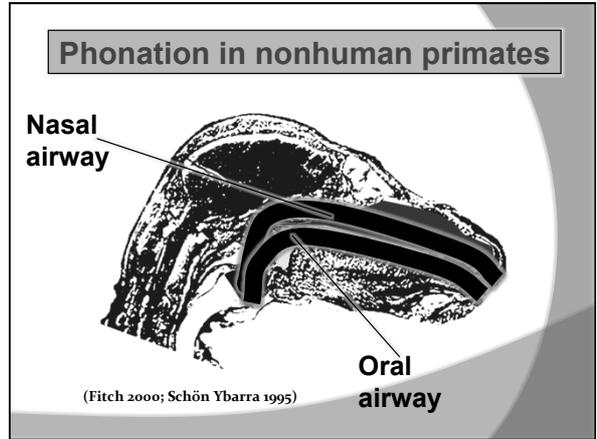
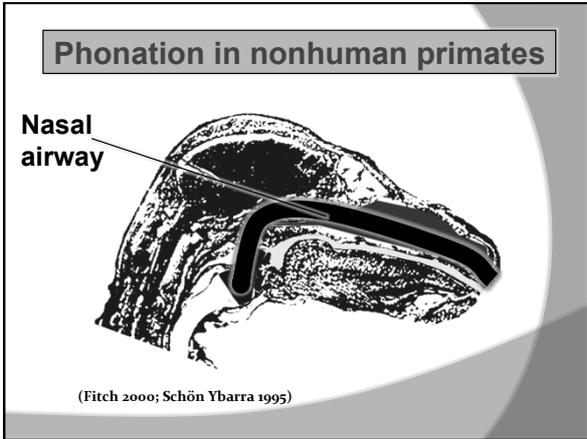
### Source-Filter and NHP

- The source-filter theory can be successfully applied to many mammal species, including non human primates!

(for a review, Taylor & Reby 2009)







**COEVOLUTION OF VOCAL COMMUNICATION AND SOCIALITY IN PRIMATES**  
(McComb & Semple, 2005)

