

MANCHESTER 1824
The University of Manchester

Learning Outcomes

- Be aware of the main acoustic cues that allow us to distinguish different **plosive** and **affricate** sounds

MANCHESTER 1824
The University of Manchester

MANCHESTER 1824
The University of Manchester

Acoustic cues - consonants

- Fricatives e.g. /s/, /f/, /ʃ/ and the voiced equivalents /z/, /v/, /ʒ/
- Plosives e.g. /p/, /t/, /k/ and /b/, /d/, /g/
- Affricates (combination of fricative and plosive) e.g. /tʃ/ as in “church” or /dʒ/ as in “jar”
- Nasals e.g. /m/, /n/ and /ŋ/ as in “ring”
- Approximants e.g. /w/, /ɹ/, /y/ and /l/
- For each different “manner” will look at the different place and voicing contrasts

MANCHESTER 1824
The University of Manchester

MANCHESTER 1824
The University of Manchester

Acoustics of consonant contrasts – plosives

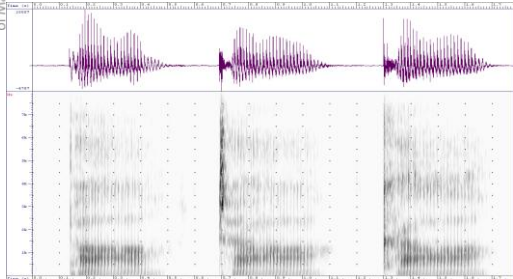
- Plosives (stops) have a temporary interruption in the airflow due to closure at some place in the vocal tract
- Can see interruption more clearly when plosive is between syllables
- Plosive release associated with formant transitions as vocal tract changes shape (e.g. F1 rise)
- Shape of F2 transition is highly indicative of the place of articulation of the preceding plosive
- Affricates are like plosives with a more slowly opening release so that some frication occurs

MANCHESTER 1824
The University of Manchester

MANCHESTER 1824
The University of Manchester

Acoustics of consonant contrasts - plosives

/pa:/ /ta:/ /ka:/

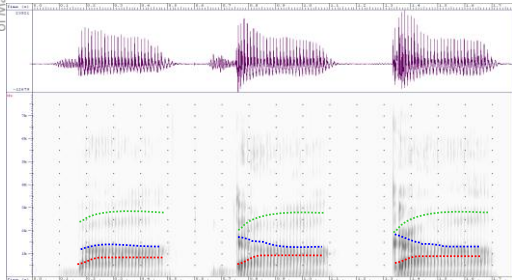


MANCHESTER 1824
The University of Manchester

MANCHESTER 1824
The University of Manchester

Acoustics of consonant contrasts - plosives

/ba:/ /da:/ /ga:/

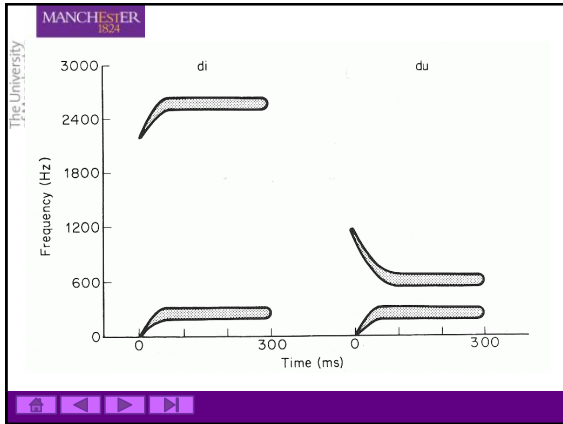


MANCHESTER 1824
The University of Manchester

MANCHESTER 1824
The University of Manchester

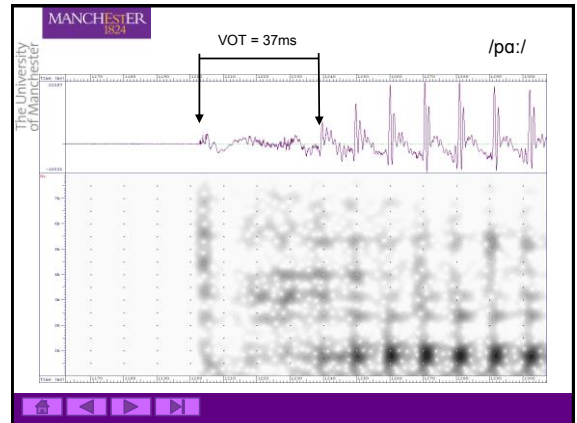
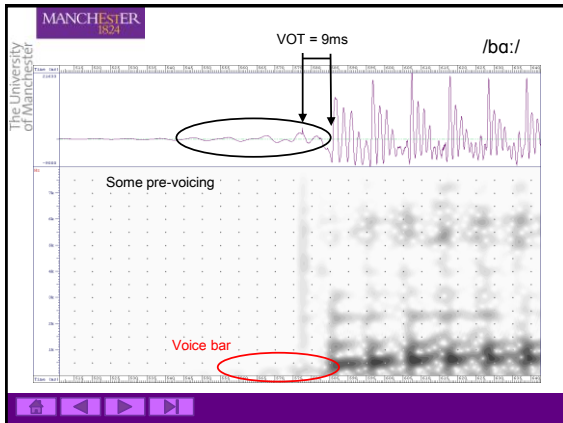
- Another example of the relationship between vowel formants and the associated consonant is where the vocal tract needs to change shape depending on which vowel *follows* a particular consonant.
- e.g. Where /i:/ or /u/ follows /d/
- The vocal tract is in a certain shape for /d/ and then needs to change shape to go into the following vowel
- Such formant transitions are important cues in a lot of consonant place contrasts

MANCHESTER 1824
The University of Manchester



cues for voicing in plosives

- Onset of voicing accompanied by low-frequency energy associated with larynx activity (*voice-bar*)
- Syllable initial consonant:
 - Periodic structure to waveform
 - Voice onset time (VOT): time between plosive release and voicing onset
 - /bdg/ : VOT < about 25ms (may even be negative)
 - /ptk/ : VOT > about 25ms



- Syllable final plosives
 - Similar acoustic cues to syllable initial
 - Duration of silence between vowel offset (closure) and plosive release
 - Formant transitions at the end of the vowel

