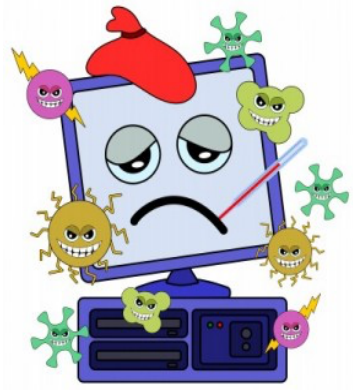
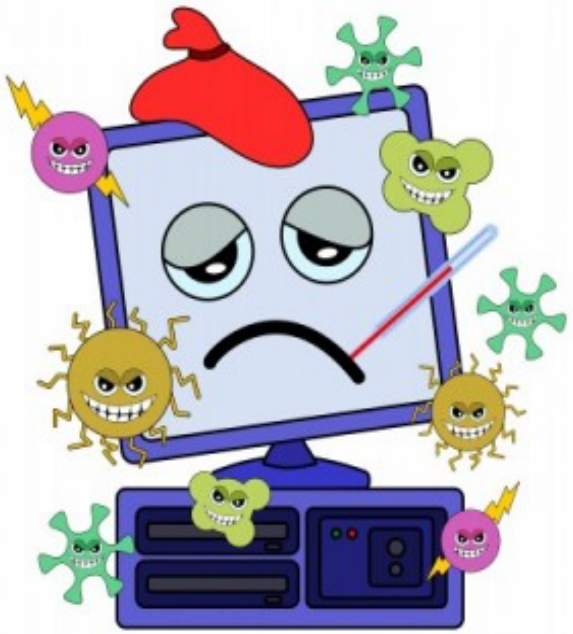
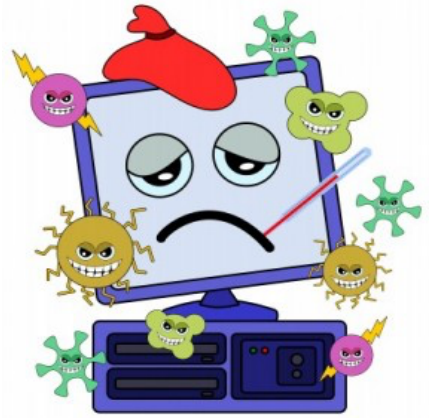
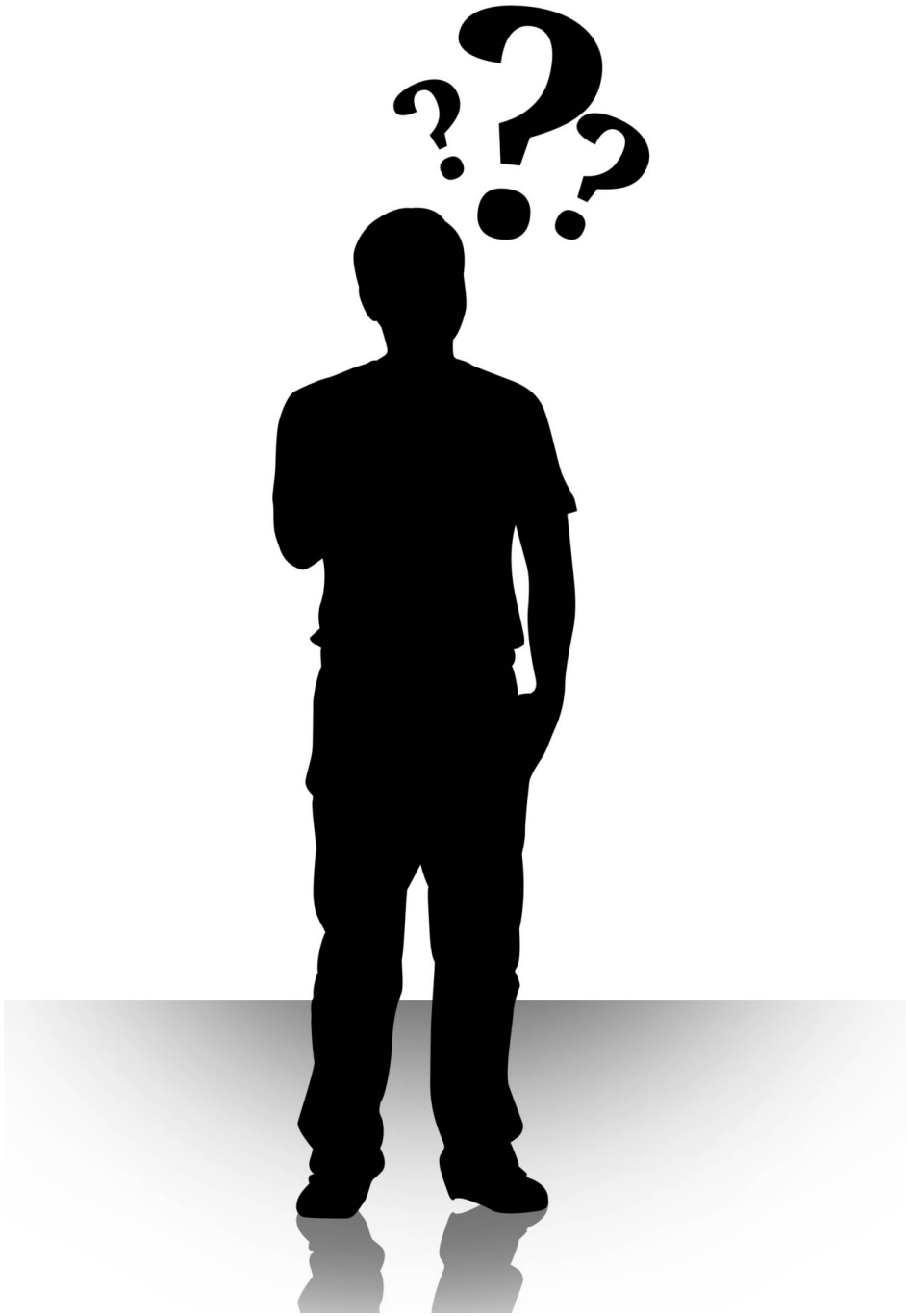
Engineering ..... design of the physical …?







....early 90s

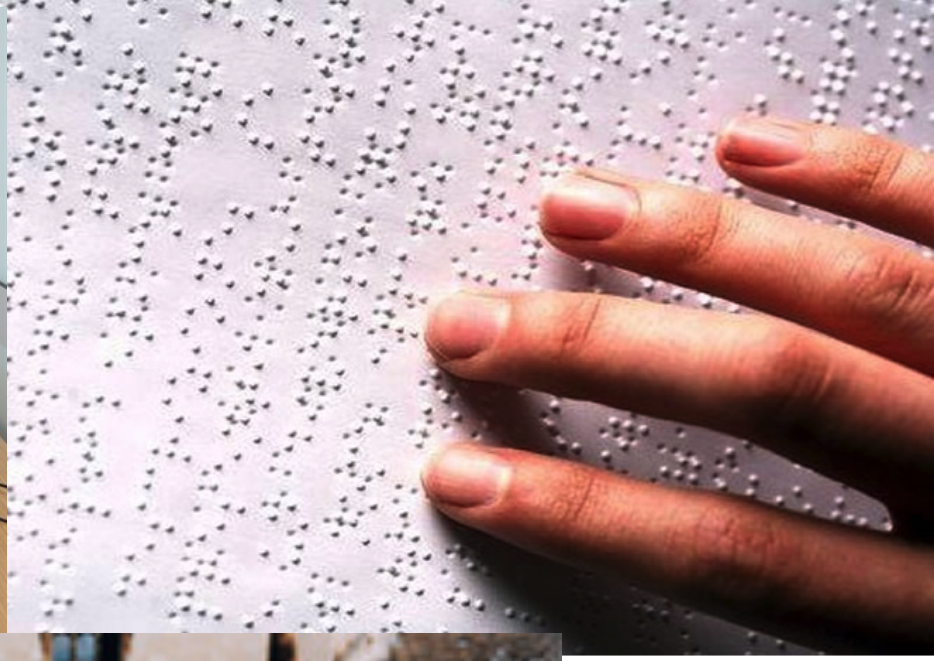


What do we live for?

Is technology really for the greater good?

Am I going to spend my life with machines?

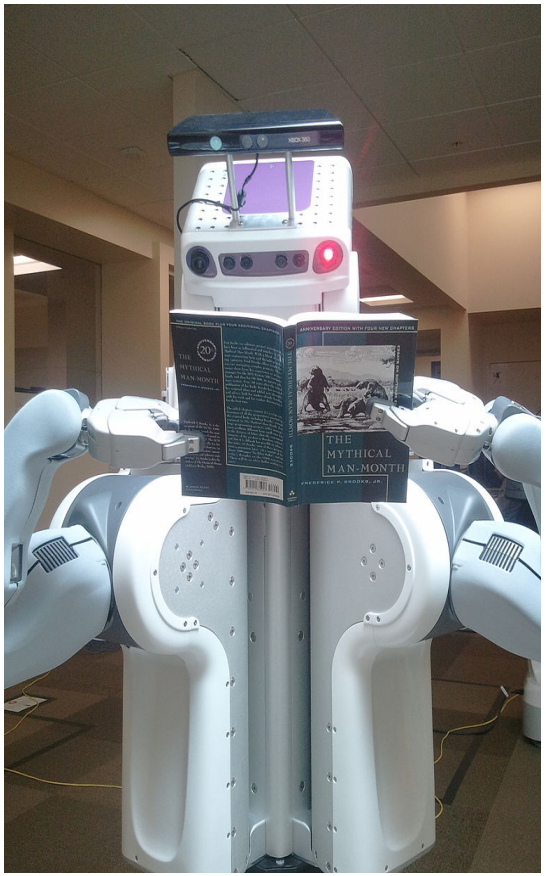
BIOMEDICAL ENGINEERING



Inspiring moments..... 1997

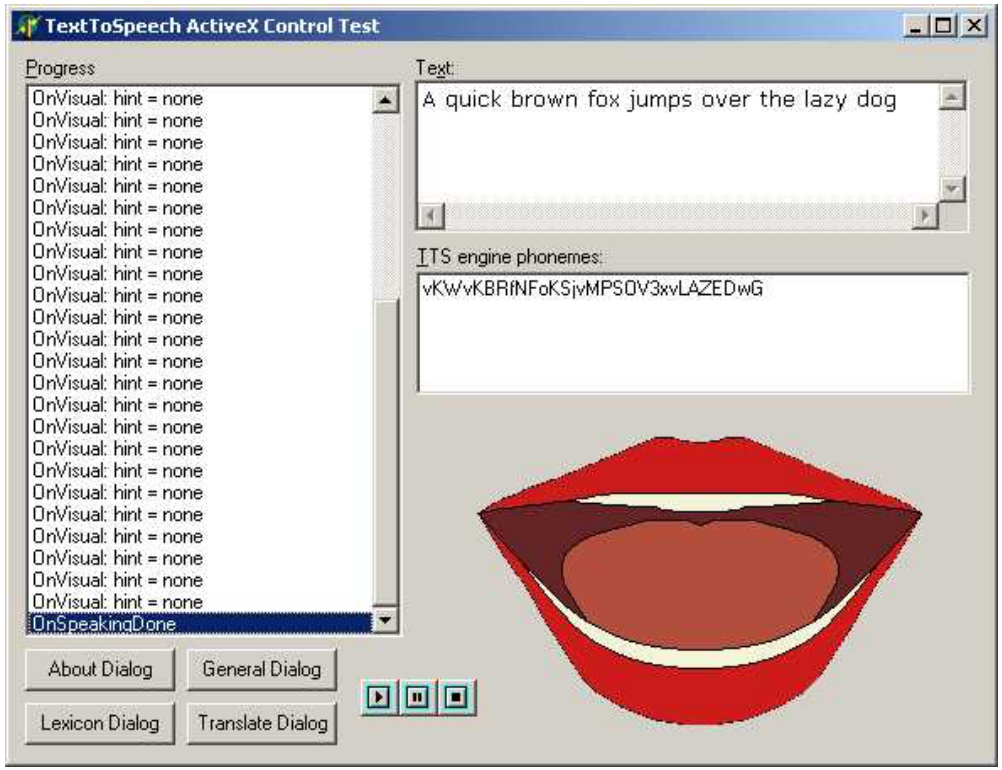
I am going to build my blind friends an automatic reading machine!

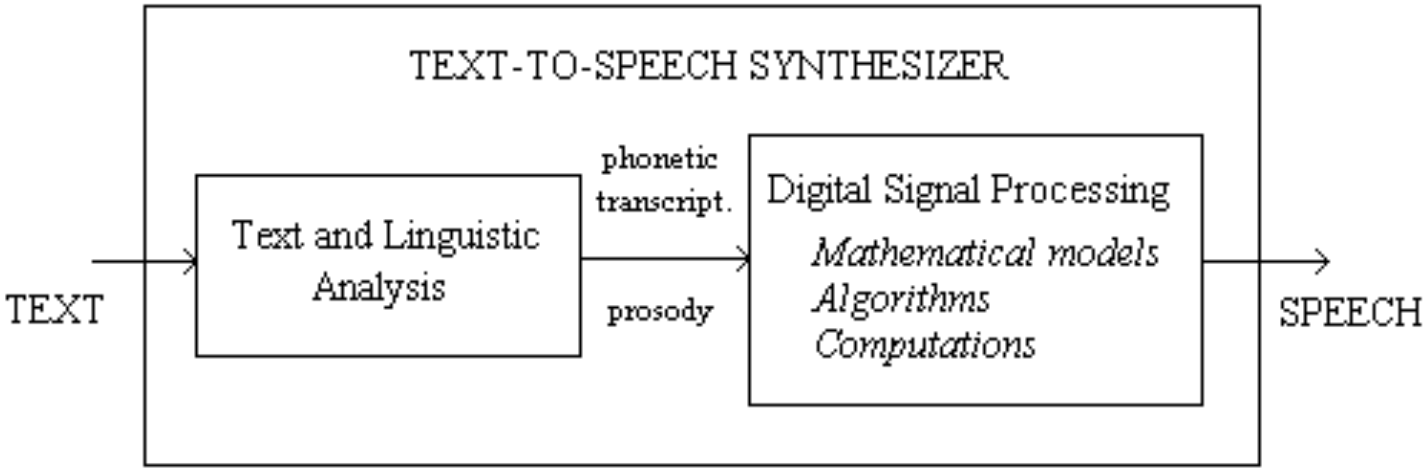
....but what is a reading machine? How should it look like?



Text-to-Speech Synthesis

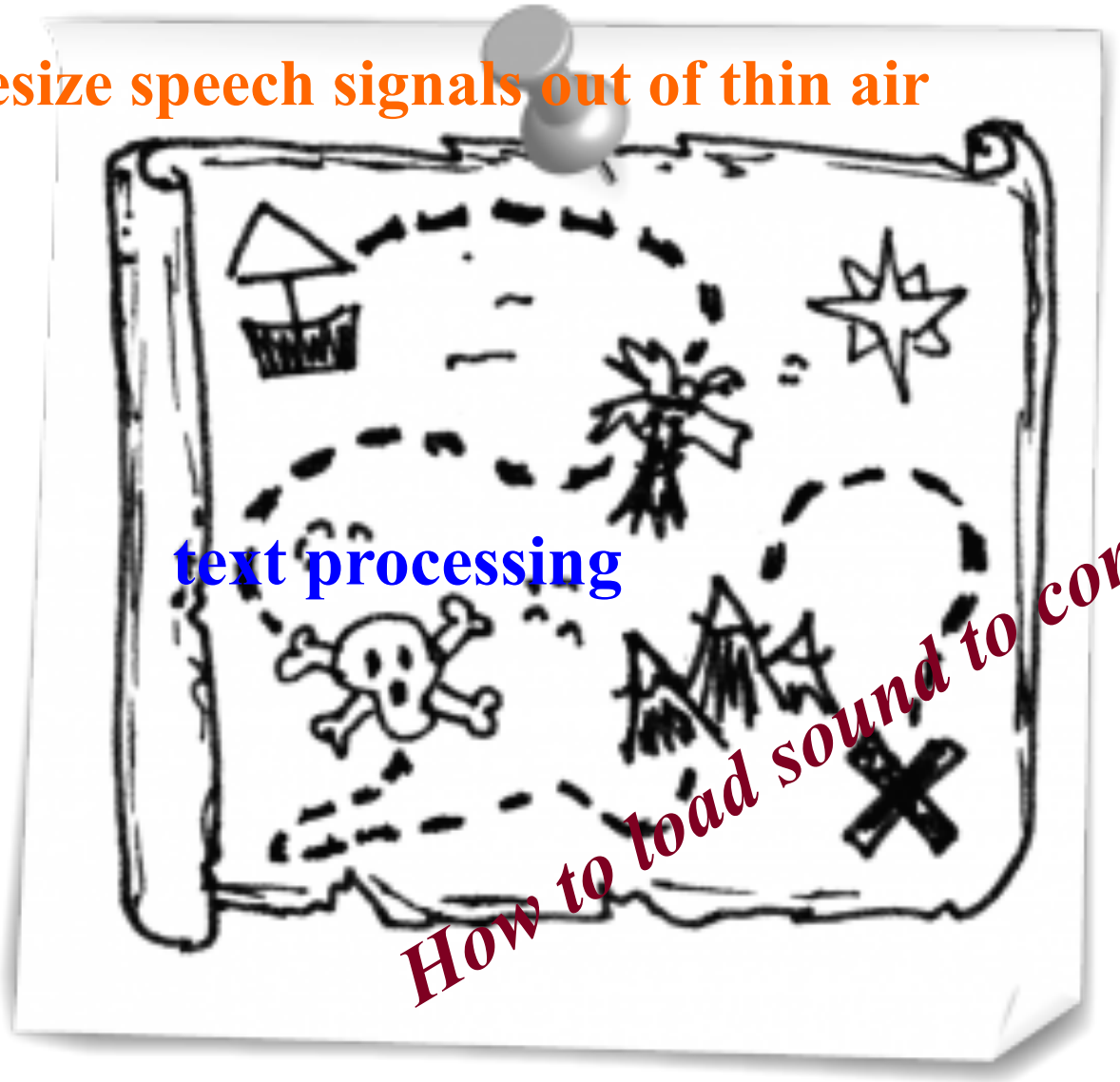
Was not available for Turkish in 1997





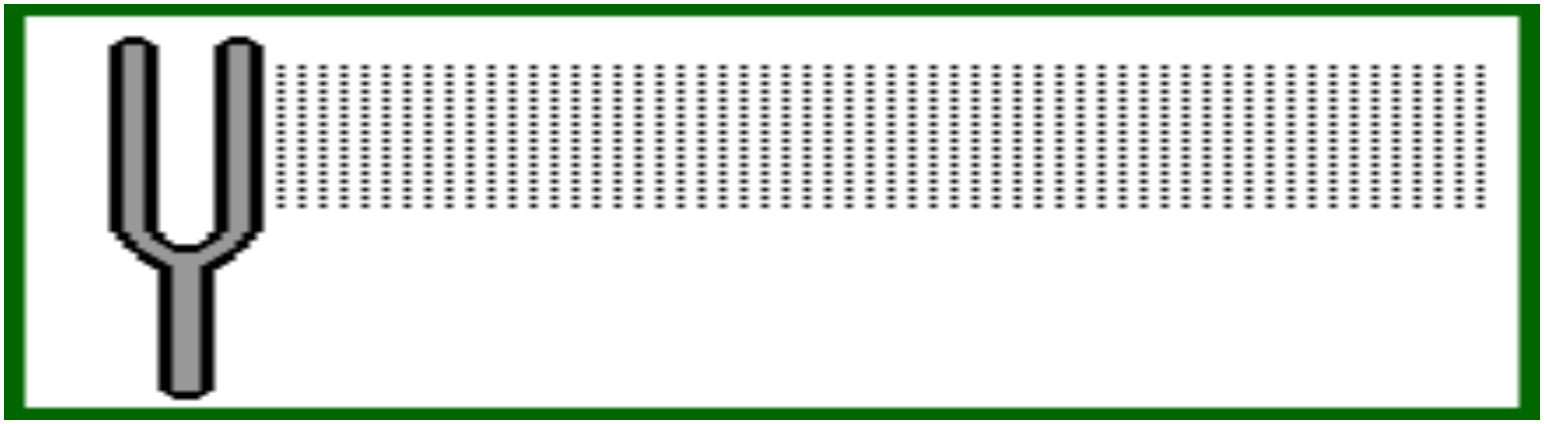
Intention -> attention, tension (stretch out)
.....
learning and growth

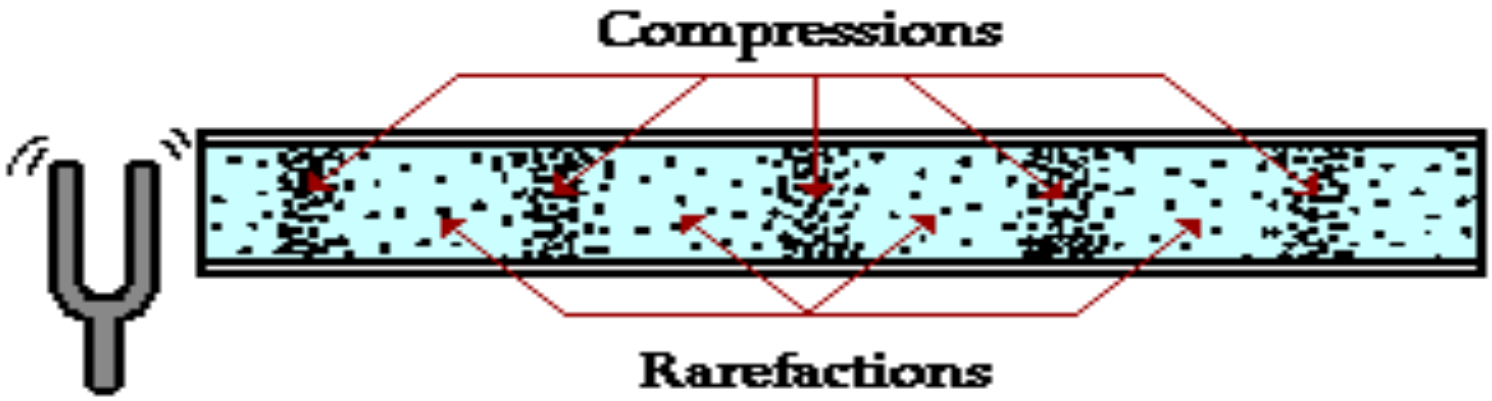
Synthesize speech signals out of thin air

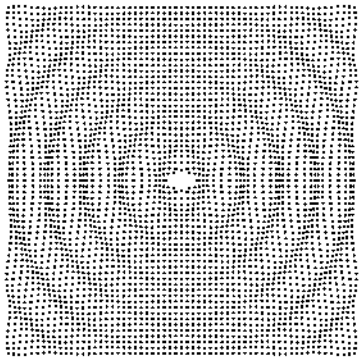


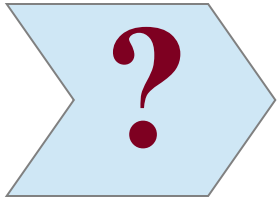
One obstacle at a time and I can tackle them all!

How to load sound to computer?



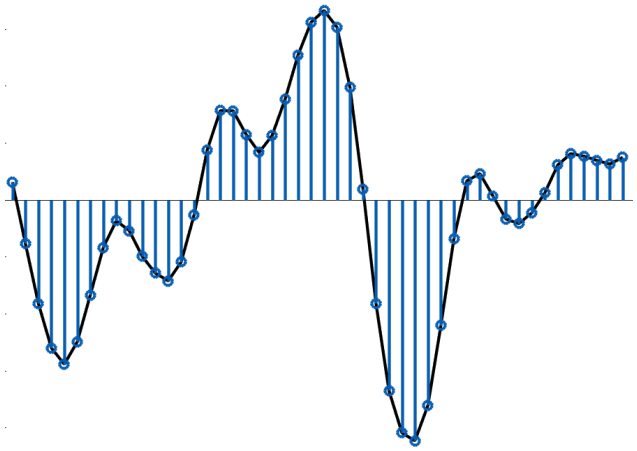

Compressions
Rarefactions



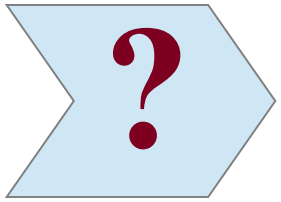

?

int ...
String ....
double ...

SAMPLING



...taking regularly spaced samples



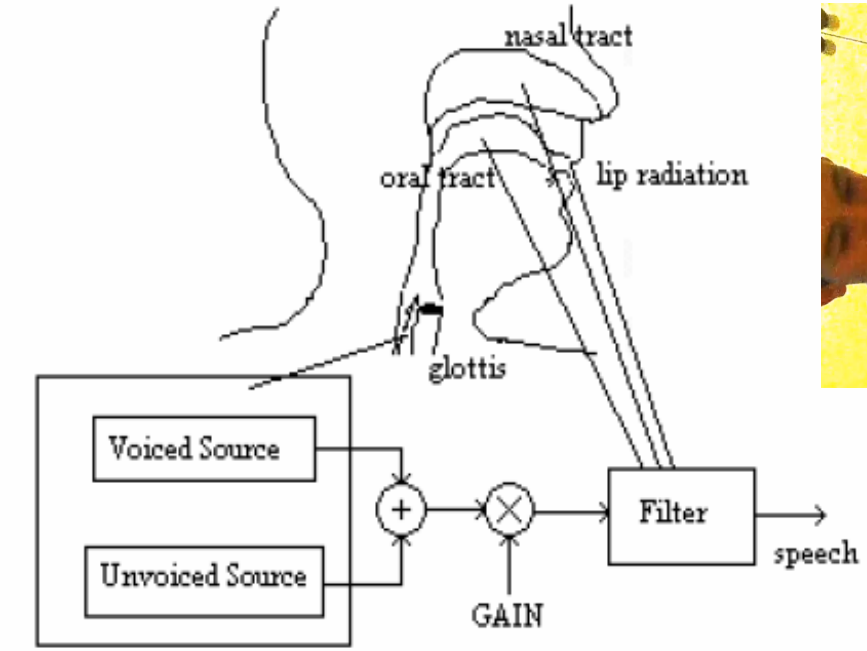
How should I represent these samples in my computer?

How can we represent a real number (for example π) ?

We have to round because we have limited space

...but we have so many of them!

Theory of sound production



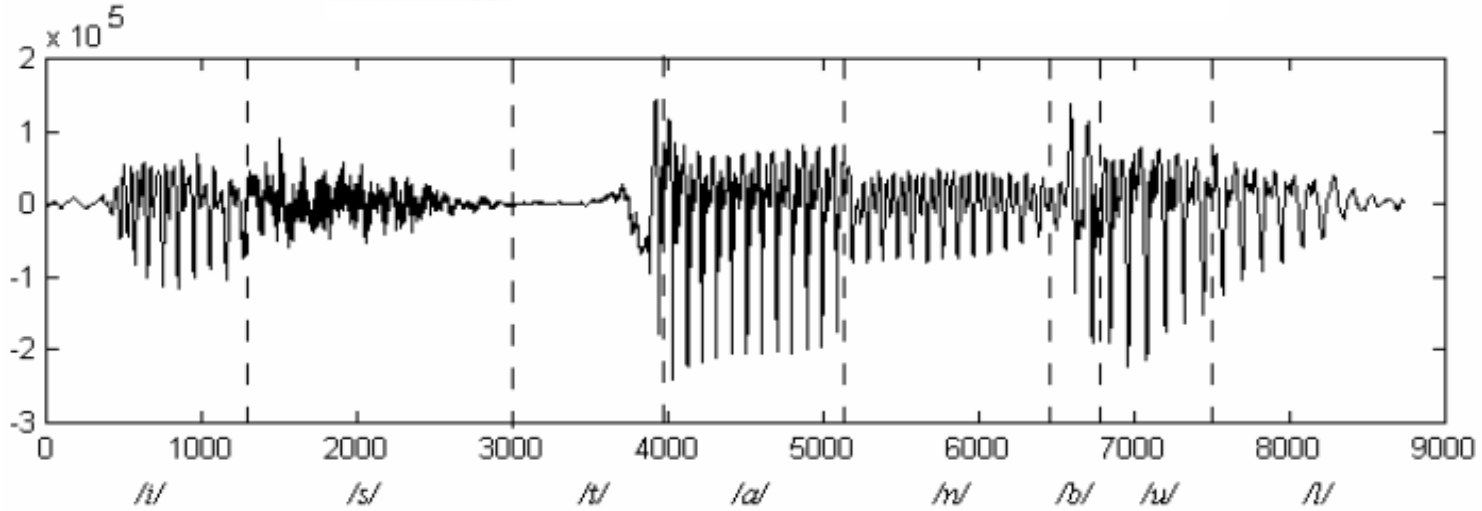
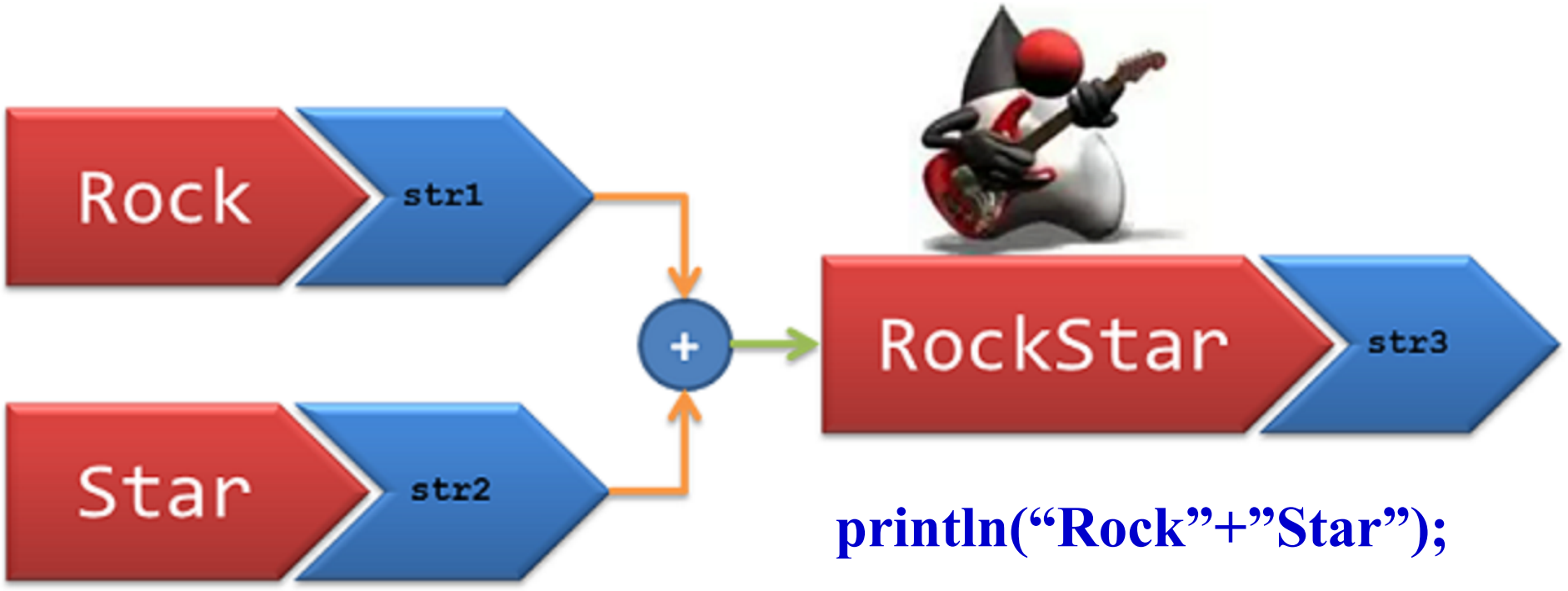


Figure 2.3 Speech signal waveform of the word 'istanbul'

Ready for the next problem?

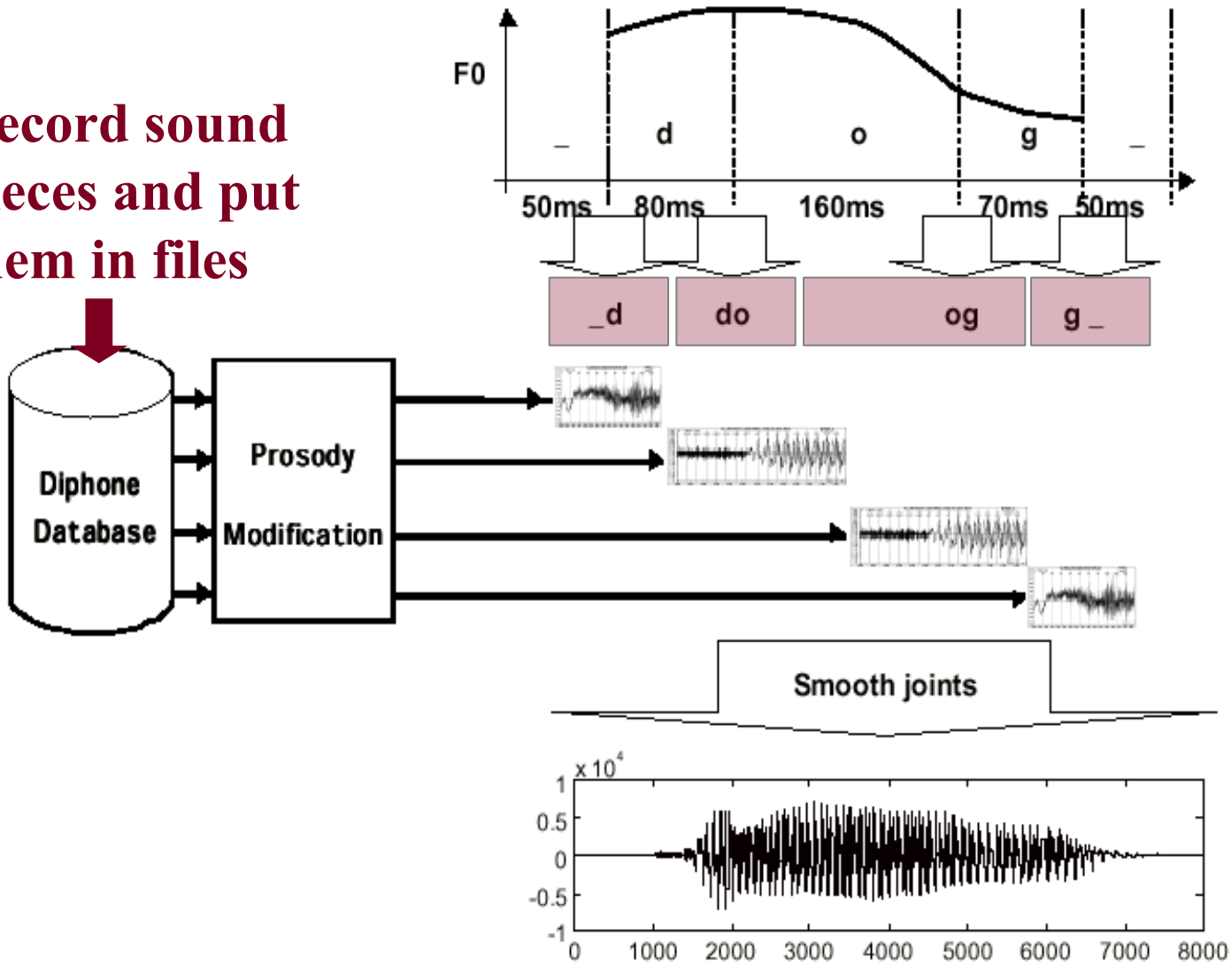


println("Rock"+"Star");

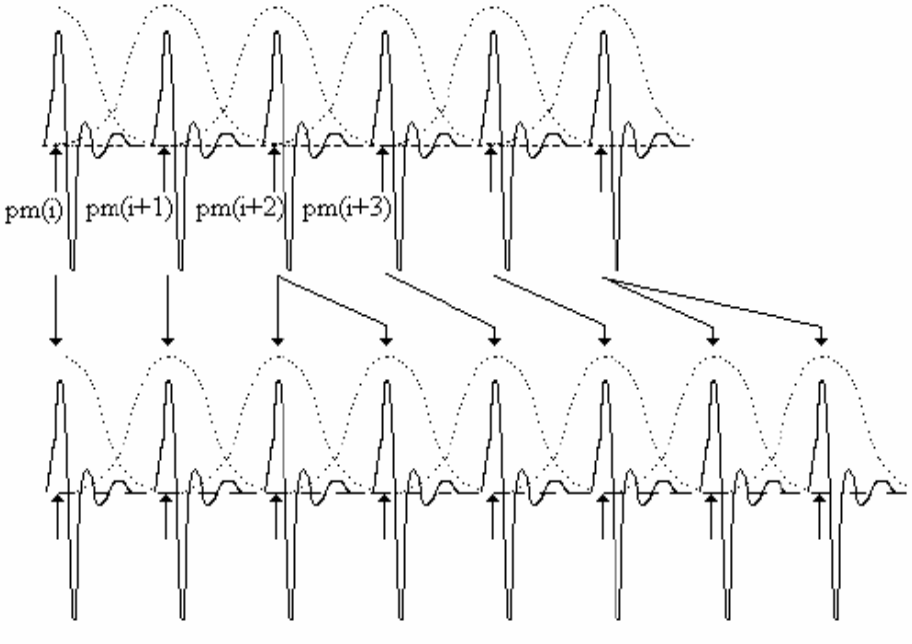
How do we concatenate sound pieces?

Concatenative synthesis

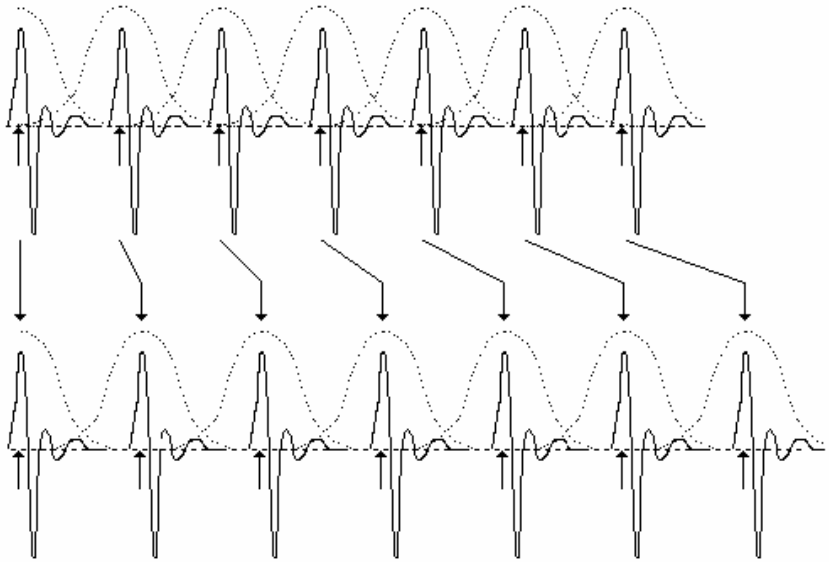
Record sound pieces and put them in files



Modifying speech signals: array processing

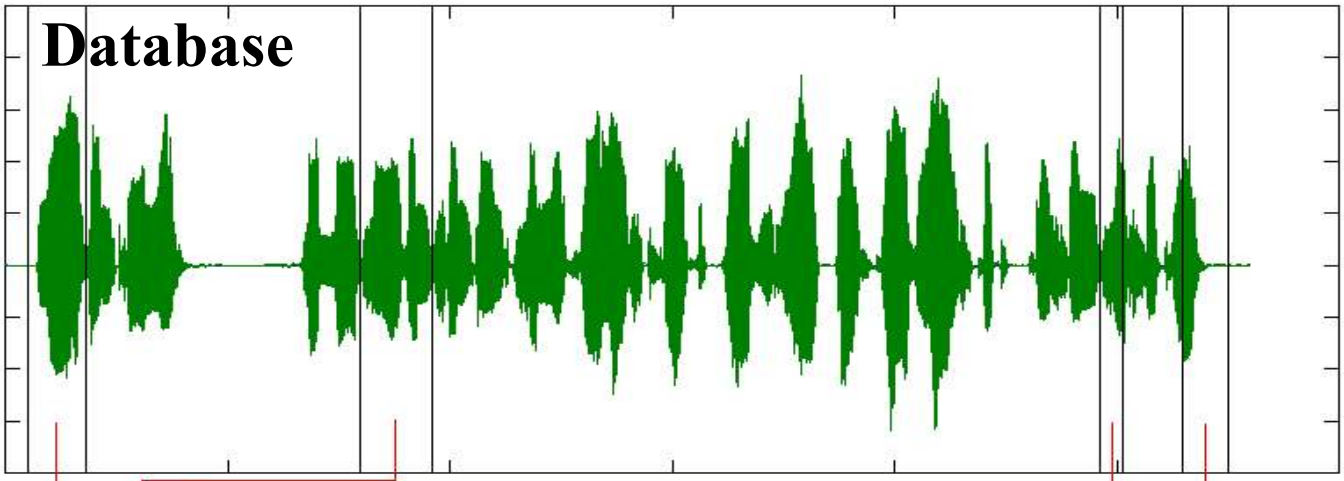


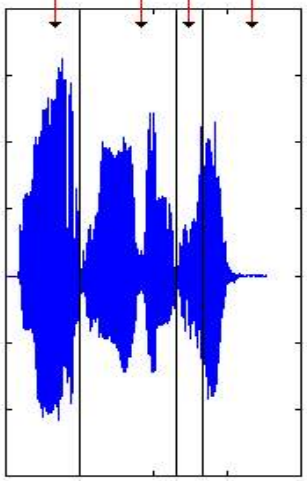
Duration modification

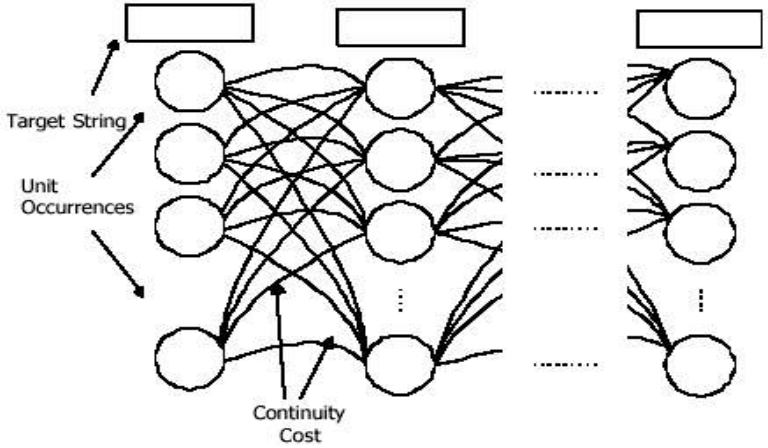


Pitch modification

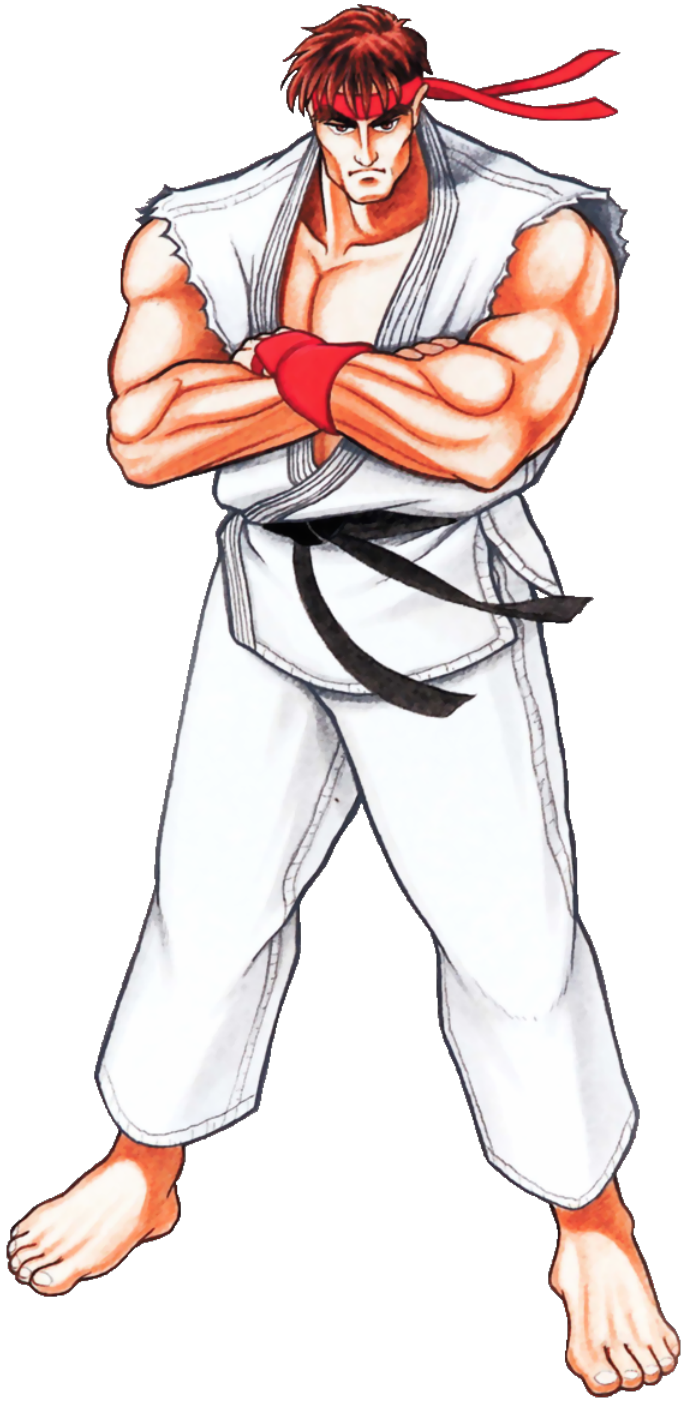
Non-uniform units based synthesis







Target: ba ar ış



So, I knew what to do:

Design a representative text for Turkish
- Selecting a few hundred sentences
  - among 2 million that covers a
  - large variety of language units

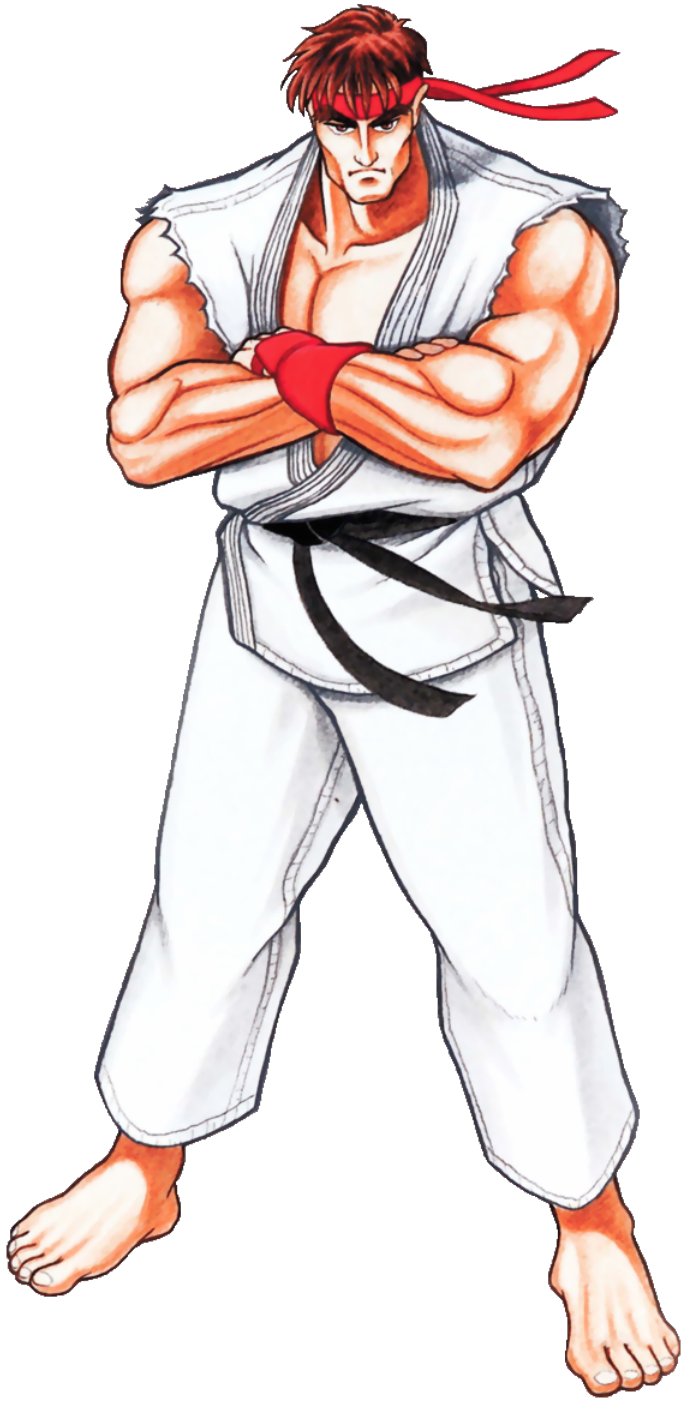
Recording these sentences

Segmenting these sentences

Writing text processing tools

```
private String readNumber(int val)
```

Year 2000 → yi@rtutaus@nd



So, I knew what to do:

- Writing a concatenator:
  - reading sound files,
  - modifying sound segments,
  - joining sound segments
- Writing an automatic selector

Finally !! (....year 2000)

....first free Turkish TTS released: it was robotic but served the need

....became part of screen reader software for blind

The MBROLA Project

Thierry Dutoit

Towards a Freely Available Multilingual Speech Synthesizer

1996 - 2006: 10 years! Happy Birthday MBROLA

Let's hear it!

.....freely available for download

_ 100
a 400 0 100 50 150 100 90
j 200
_ 500 0 200
l 100 0 100
a 500
v 100 0 200
_ 500
k 100 0 100
e 100
R 100 0 150
@ 100
l 100
_ 100 0 80

Turkish database

_ 100
a 400 0 100 50 150 100 90
j 200
_ 500 0 200
l 100 0 100
a 500
v 100 0 200
_ 500
k 100 0 100
E: 100
r 100 0 150
@ 100
l 100
_ 100 0 80

German database

_ 100
a 400 0 100 50 150 100 90
j 200
_ 500 0 200
l 100 0 100
a 500
v 100 0 200
_ 500
k 100 0 100
e 100
R 100 0 150
@ 100
l 100
_ 100 0 80

French database

What do we live for?

How can make a change for the greater good?