

Emotional Prosody Measurement (EPM)

A voice-based evaluation method for
psychological therapy effectiveness

Egon L. van den Broek
e.vandenbroek@nici.kun.nl

Goal: Therapy evaluation

Aim:
An indirect Physiological
measure

Why?

Questionnaires

Psychiatrists expert judgment

Respons of the patient self

How: Speech analysis

Utilizing the fundamental frequency ...

Why?

It is an *indirect* physiological measure

Not heart rate

No muscle tension

Pilot study

- Mimicking emotions ...
- Two contexts (1 story title):
 - Cancer
 - Baby

No influence of the words or sentences

6 participants

Final studies

1. Reliving traumatic experiences
2. Telling stories

2 blocks in each study (traumatic / pleasant)

So, we were able to compare speech in two ways:

1. Within blocks
2. Between blocks

Participants

- Suffering from a Post Traumatic Stress Disorder
- All adult females
- 26 Volunteers

Why them?

- Real stress could be triggered ...
- So, an ecological valid research was possible!

Speech signal

Speckle noise reduction (and LPF)

Further: ticks, coughing, etc. were manually removed

'Clean'
speech signal

Fourier Transform

F0-signal

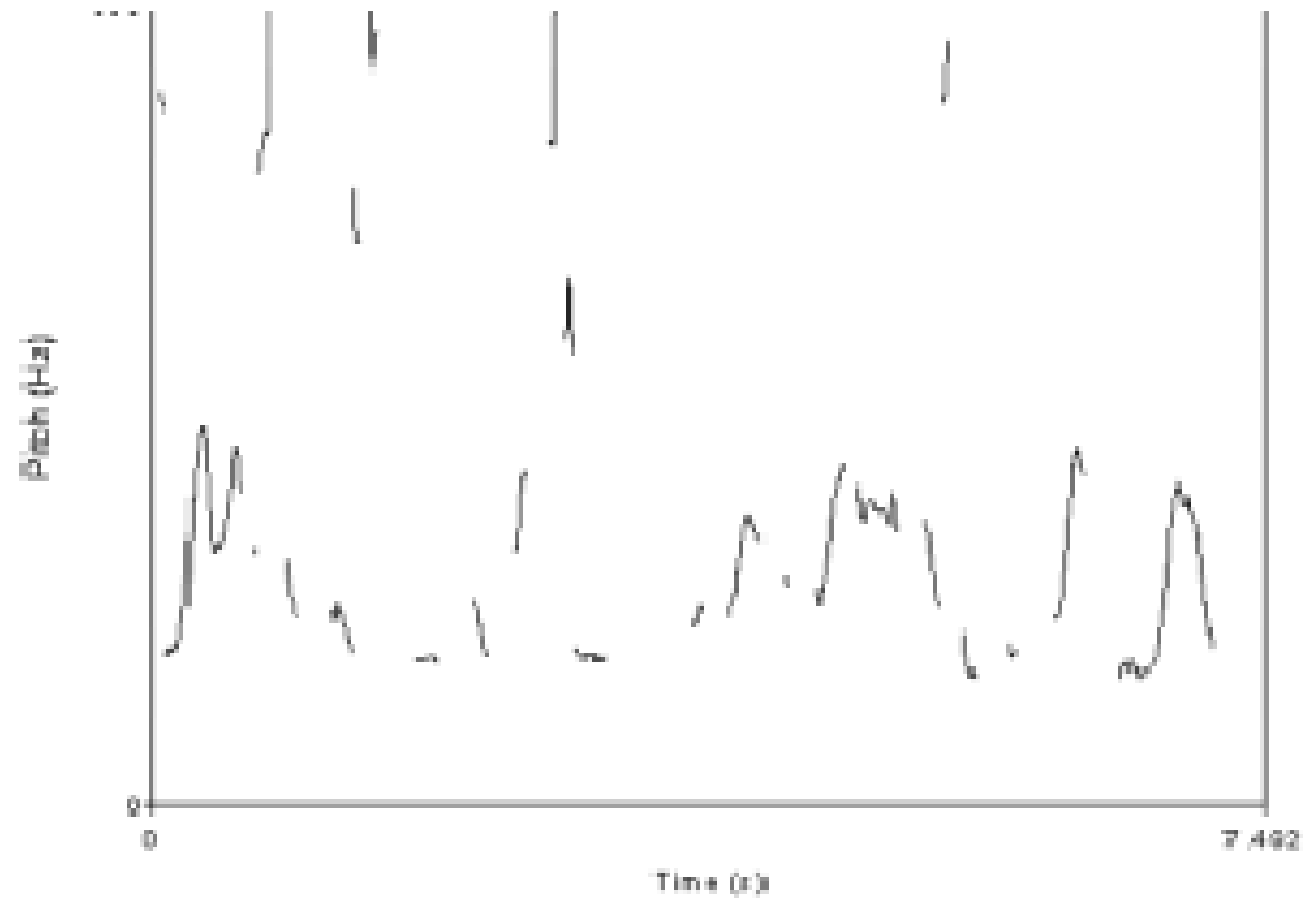
Statistics

Statistics

- Median
- Mean
- Standard deviation
- Difference between quantiles (90%-10%)

SD F0

A happy person speaking



A sad person speaking



Validation of the SD F0

- So, a new measure has been defined ...
- But, is it valid: Do we measure what we want to measure?

The S.U.D.

Subjective Unit of Distress

one each minute ...

scale: 1 - 10

Speech is analyzed in
samples of one minute

Speech and SUD were
compared for each minute.

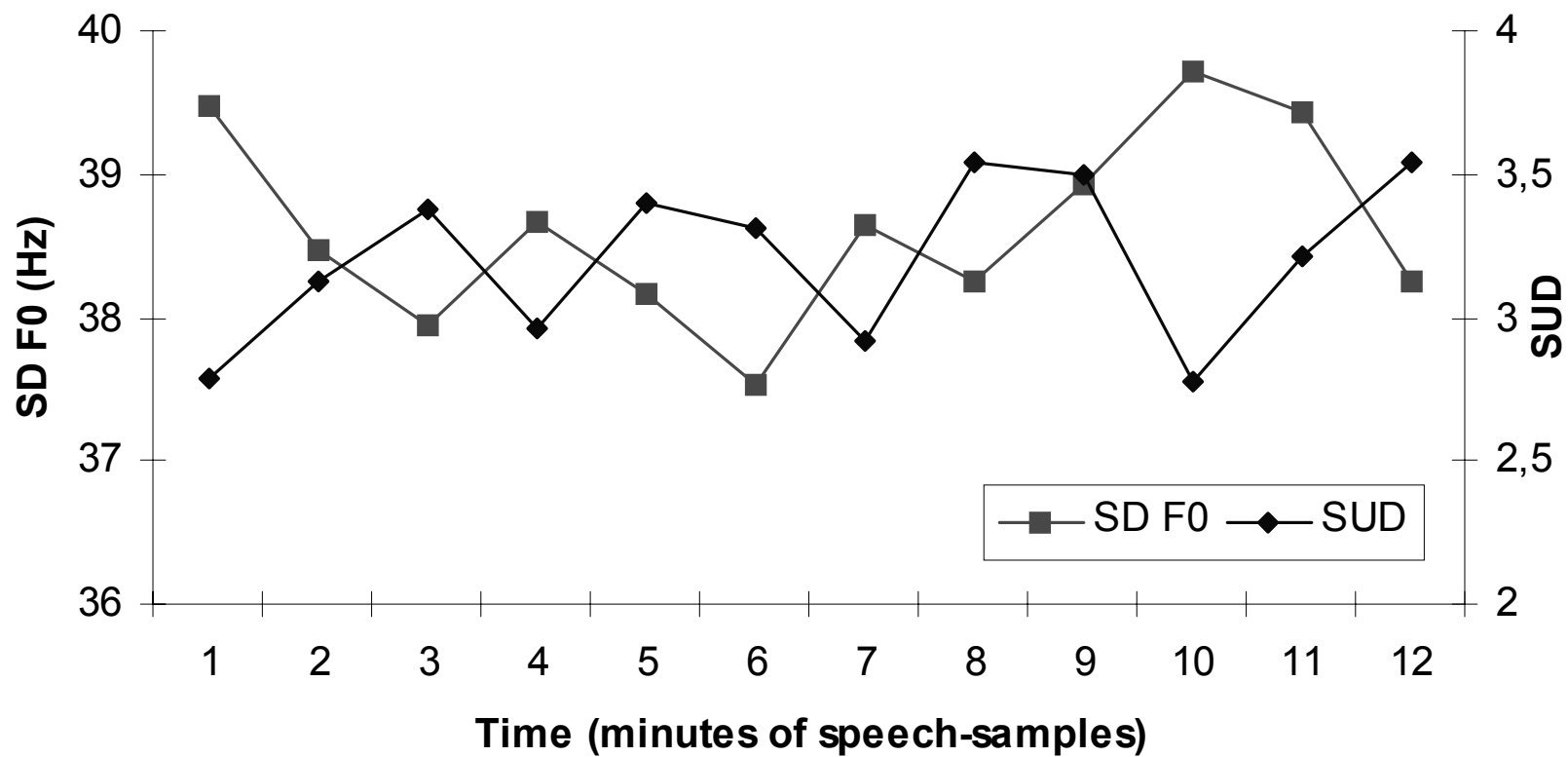


Figure 3. The average normalized Subjective Unit of Distress (SUD) and the Emotional Prosody Measurement (EPM) by the standard deviation of the F0 (SD F0) of 12 minutes of 'clean' speech-samples during the experiment.

Conclusions

- An indirect physiological measure
- Measures the amount of stress
- It does NOT determine the source!
- Automated
- So, easy to use

Other areas of application

- A doctor speaking with his patient on the phone.
- A user interacting by speech with a computer.