

Real Time Speaking Rate Monitoring System

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Introduction

- A metric to measure the rate at which speech is spoken

Why is the Need to Measure Speaking Rate?

- **Fast Speaking Rate** makes conversation **unintelligible**
- Whereas **Slow Speaking Rate** makes conversation **boring**
- **Monitoring** of Speaking Rate can **assist** call center **agents speak** at the desired rate
- Several aspects of a call conversation can be analyzed based on speaking rate
 - Without actually having to convert speech to understandable text (speech to text)

What Influence Speaking Rate?

- Speaking rate definitely varies depending on the **emotional state** of the person when s/he is speaking
- **Regional** and **cultural** influences the speaking rate

How is it Measured?

- Measured in **number of words spoken per minute** or **number of syllables spoken per second**

Speaking Rate

- As per studies, Average English-speaking rate
 - between **130 and 200 Words Per Minute (WPM)**. applies to 90% of the English-speaking population.
 - **complex material**, a speaking rate of **130 to 145 WPM** may be required and
 - **average complexity**, a speaking rate between **145 and 175** is optimal
 - **simple material**, many listeners can accommodate **over 175 WPM**.
- **Monitoring Speaking Rate** of a **call center agent in real time** is essential and can **improve CSI** (Customer Satisfaction Index) by several notches



[illegible]

$$SR_{(sps)} = \frac{N}{T_{total} - T_{silent}}$$

Where, **N** = number of syllables spoken per unit time

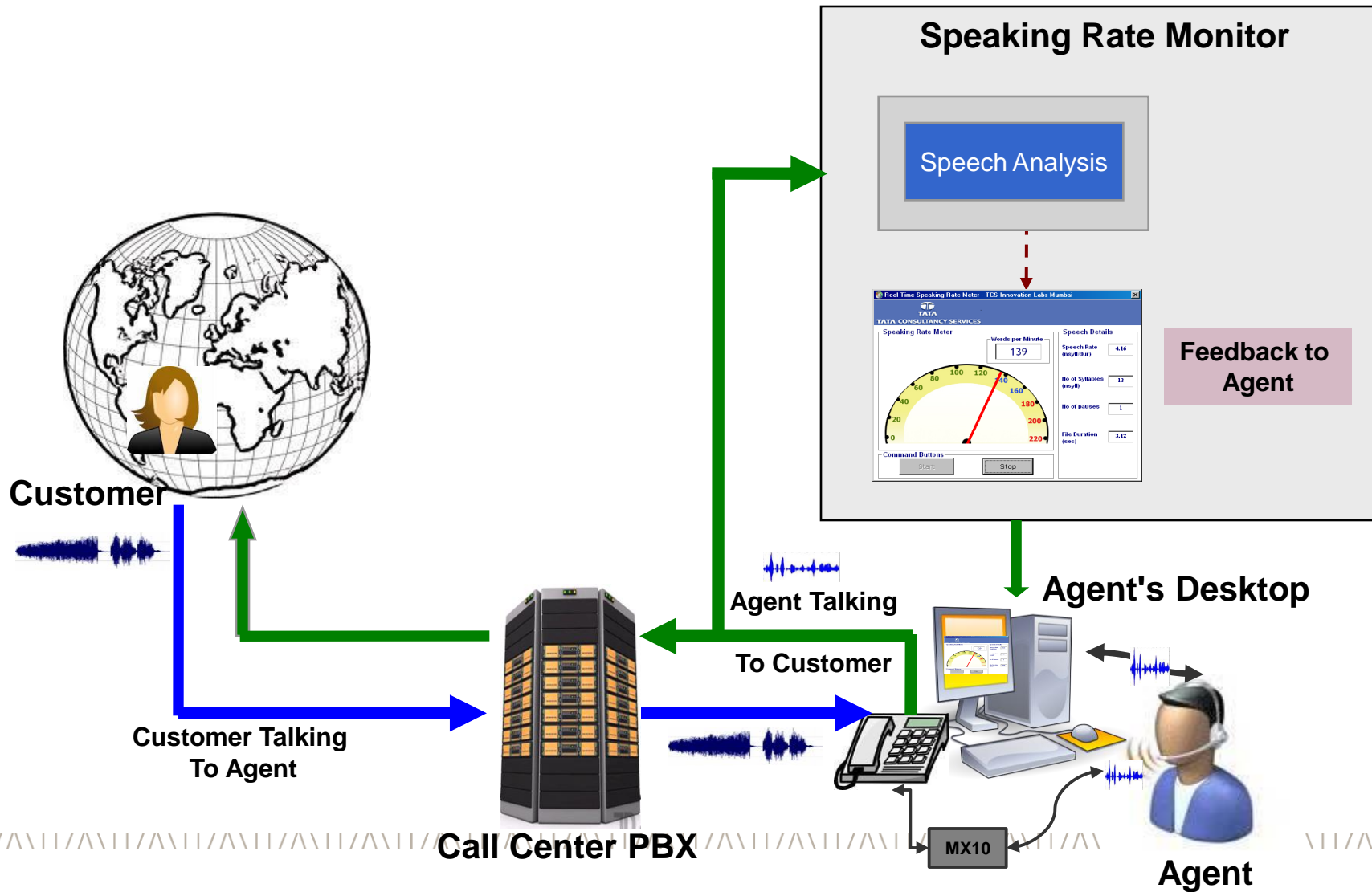
T_{total} = total speech time

T_{silent} = duration for which no speech was detected

$$SR_{(wpm)} = \Psi \times SR_{(sps)} \times 60$$

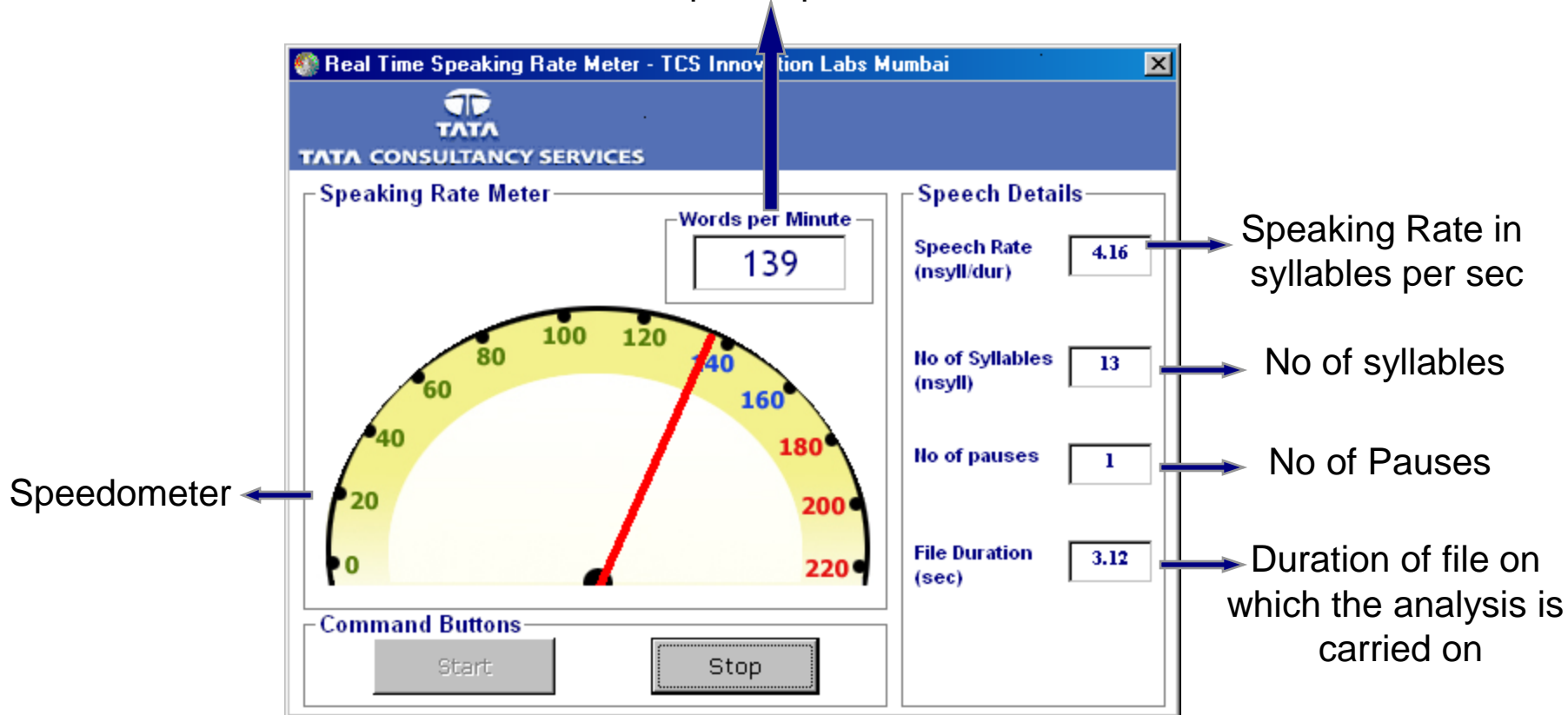
Where conversion factor, $\Psi = 1.5$

A Typical Call Center Senario



Speaking Rate Monitoring Real Time – Agent Interface

Speaking Rate as
words spoken per minute



(a) Indicator Speak Slower



(b) Indicator Speak Faster

Experimentation and Results

- Level 1: **Performance Accuracy** was tested on a **text** - ***“The first one believed in faith, he thought”***
 - Method 1: Using the **Algorithm**
 - **No of syllables = 8**
 - Method 2: **Manually** calculating the number of syllables in the text
 - Th/e/ f/i/rst /one/ b/e//i/e/v/e/d in f/a/i/th, he th/ou/ght
 - **No of syllables = 8**
- Level 2: **Performance Accuracy** : A **short paragraph in English** was asked to be spoken by **10 persons** with **3 different Speaking Rate**
 - The number of syllables identified **using algorithm** for these 30 spoken speech was **within 10%** of the actual number of syllables, present in the text

Challenges

- For Enabling Real Time Speaking Rate Monitoring System we had the **challenge of computing** the speaking rate not only **accurately** but also **quickly**.
 - **Experimented** with several **duration** of **speech signal** and **converged** to the fact that **analyzing a 5 sec speech sample every 1 second** gave the **desired results** of accuracy
- **Note:** The **longer** the **duration** of the **speech analyzed** the **better** is the **accuracy** of **detection of syllables** and hence computation of speaking rate.
- Further the delay of 5 sec was found to not cause any feel of a delay by the agent.

Conclusions

- The speaking rate monitoring system was ***used*** on the ***agents desktop*** in the floor of a call center and gave a ***real time feedback*** to the agent.
- The feedback ***allowed*** the ***agent to change*** the ***speaking rate on the fly***
- Speaking Rate icon on ***taskbar/popup messages*** has a ***significant effect*** on ***CSI*** in an Agent-Customer interaction
- Use Cases
 - Analysis based on Speaking Rate can ***identify calls with low CSI*** (agent speaking fast) and also where the ***customer is unhappy***.

Thank You.

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