INTERNATIONAL STANDARD

ISO 24620-3

First edition
2021-02

Language resource management — Controlled human communication (CHC) —

Part 3: Basic principles and methodology for controlled oral communication (COralCom)

Gestion des ressources linguistiques — Communication humaine contrôlée (CHC) —

Partie 3: Principes de base et méthodologie de la communication orale contrôlée (COralCom)

Reference number
ISO 24620-3:2021(E)

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Published in Switzerland

Contents

Page

Foreword

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This document was prepared by Technical Committee ISO/TC 37, *Language and terminology*, Subcommittee SC 4, *Language resource management*.

A list of all parts in the ISO 24620 series can be found on the ISO website.

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Introduction

No human is expected to master and speak several languages with the same level of competence as their own mother tongues. Faced with rapidly increasing multilingual situations, misunderstandings and confusion arise in daily communications, very often causing accidents and casualties. Industry and other business sectors, as well as different domains dealing with safety critical applications such as emergency services (police, fire, ambulance, maritime, etc.) require a precise and concise language to supplement the common use of natural human languages. Uncontrolled, these languages would allow non-parallel and non-comparable grammatical constructions, possessing inherent semantic ambiguities of variously phonetic, phonological, morphological, lexical or syntactic types.

Human communication is primarily oral, making use of the spoken medium of language.

Oral communication between native speakers, or non-native speakers, or a native speaker and a non-native speaker, can be disturbed due to different phenomena such as phoneme confusion and the resulting ambiguities due, for example, to multilingual communication or stressful situations. For an early study focussing on perceptual confusion among some consonants, see Reference [11]; for a more recent study concerning sources of variability in consonant perception, see Reference [12]. For a study and system on interferences in the domain of aeronautics and others, see References [6] and [7].

However, whatever the disturbance, the impaired communication results in confusion between distinctive phonetic features, phonemes and words including the problem of co-articulation (see Reference [24]). For early studies in the domain where phoneme confusion and interferences, and archiphonemes (see Reference [25]), norms, variants and common properties of all variants, distribution of variants as a norm, as well as distinctive features of a phoneme, are presented and detailed, see References [13], [14] and [15].

This document deals with confusion and variable pronunciation or interpretation of distinctive phonetic features (including accents, stresses, and tones or lengths) and phonemes, but also homophones, homographs, and quasi-homophones and quasi-homographs.

The basic acoustic processes involved in speech production are the generation of sound sources and the filtering of these sources by the vocal tract. The sources are generated by the modulation of airflow through narrow constrictions produced at the larynx or in the vocal tract above the larynx, airflow that is usually the result of action of the respiratory system. The filtering of the sources is controlled by manipulating the shape of the vocal tract airway above the larynx, including the opening between the oral portion of the vocal tract and the nasal cavity. The acoustic properties of the sources and of the filtering of these sources can be varied by manipulating a number of different articulatory parameters relating to the laryngeal configuration, the positions and shapes of the lips, the tongue blade, the tongue body and other structures, and the stiffness of particular structures. Some of these manipulations lead to relative stable acoustic properties that are perceptually distinctive. These particular manipulations play a role in the selection of inventories of sounds consisting of discrete units such as features, segments, and words in terms of which language is structured (see Reference [17]).

Sounds of languages are described as sets of phonemes (see Reference [26]). All phonemes can be distinguished by at least one (acoustic/articulatory) feature. Every language takes a limited number of articulatory/acoustic features out of a virtually unlimited number of possibilities. For most known languages, the inventory ranges between thirteen and seventy-five phonemes (see Reference [19]). The phonetic characteristics of individual members of the inventory are, as a rule, given through matrices showing articulatory/acoustic features. A universal phonemic inventory has been provided (see References [20] and [22]). A phoneme system is the overall pattern of characteristics and relationships of the phonemes in the phonemic inventory of a given language. The phonological characteristics of the phonemes and their allophones are described by articulatory/acoustic features, the interrelationships between phonemes through oppositions. For a discussion of the importance of distinguishing between acoustics and articulatory features, a formant chart of the vowels of standard French and an illustration of the neutrality of distinctive features between production and perception, see Reference [21].

Human beings recognise in their respective language a phoneme and its variants which allows them to understand a word. In phonetics, sound variants belonging to one and the same phoneme are