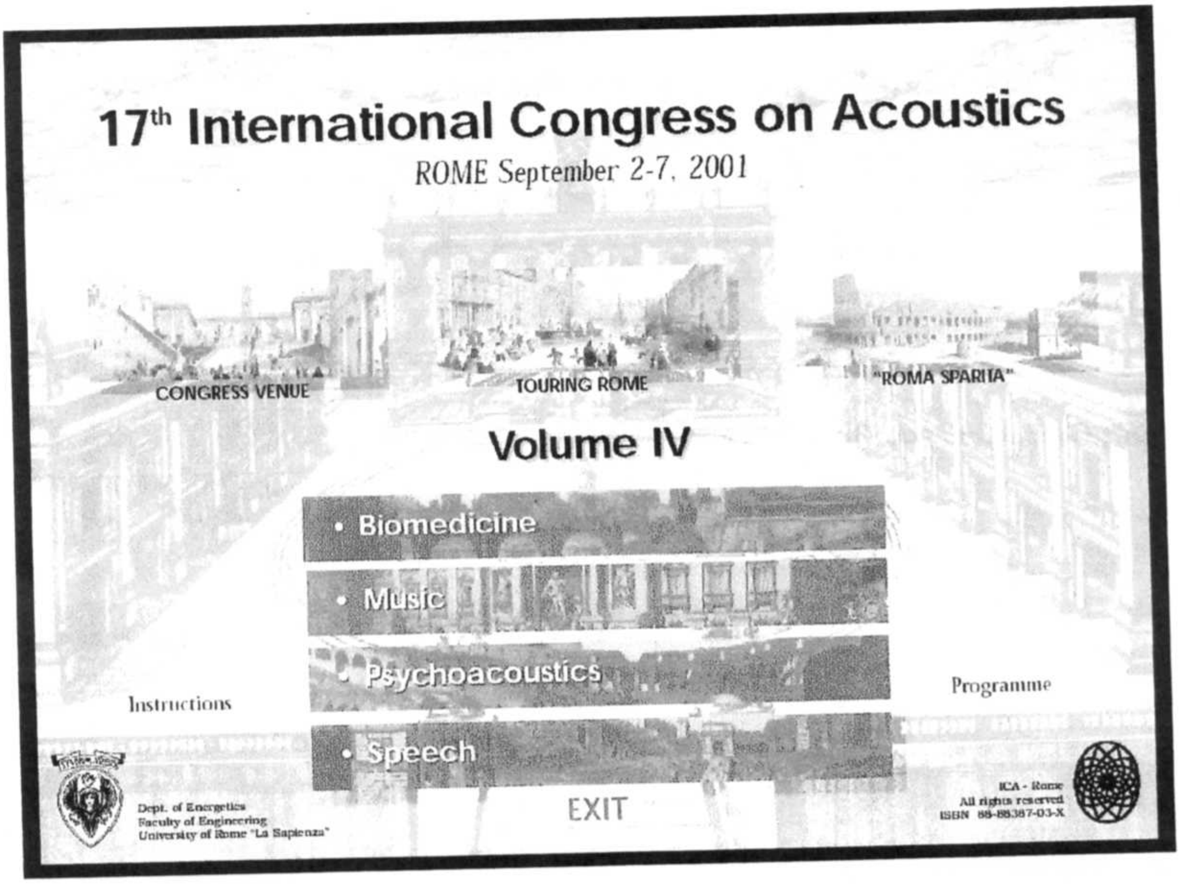
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ROME September 2-7, 2001
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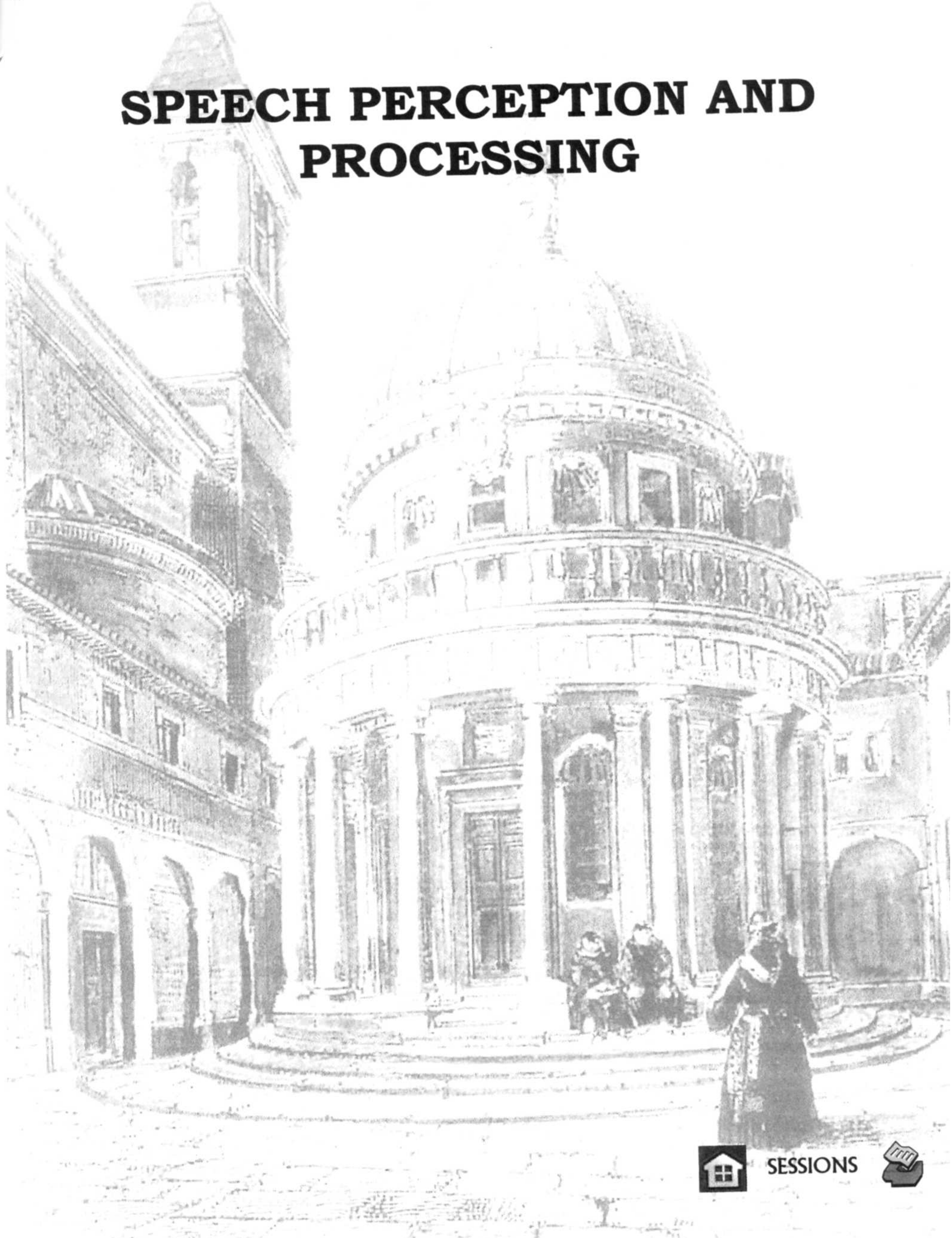
Volume IV

SPEECH

SPEECH PERCEPTION AND PROCESSING



SESSIONS

September 3RD, 2001 - Monday

PERIOD "A"

3A.01 WAVES IN LAYERED MEDIA

08:20 **3A.01.01 - LAMINATED PLATES OF VARIABLE THICKNESS AS EFFECTIVE ABSORBERS FOR FLEXURAL VIBRATIONS** - V.V. Krylov - *Loughborough University, UK.*

08:40 **3A.01.02 - ULTRA ACOUSTIC WAVES DISPERSION AND LOCALIZATION IN LOW-SYMMETRIC ANISOTROPIC WAVEGUIDES OF A THREE DIMENSIONAL GEOMETRY** - V.I. Storozhev, V.A. Shpack - *Donetsk National University, Donetsk, Ukraine.*

09:00 **3A.01.03 - SUPERSONIC LOVE WAVES ON STRONG PIEZOELECTRICS OF SYMMETRY MM2** - A. Darinskii[1], M. Weihnacht[2] - [1]*Russian Academy of Science, Moscow, Russia;* [2]*Institute for Solid State and Materials Research, Dresden, Germany.*

09:20 **3A.01.04 - IMPROVED MULTIMODAL APPROACH IN WAVEGUIDES WITH VARYING CROSS-SECTION** - C. Hazard[1], V. Pagneux[2] - [1]*ENSTA/SMP, Paris, France;* [2]*LAUM, Université du Maine, Le Mans, France.*

09:40 **3A.01.05 - MEASUREMENTS ON SOUND PROPAGATION CHARACTERISTICS IN SNOW LAYER** - T. Iwase[1], T. Sakuma[2], K. Yoshihisa[3] - [1]*Niigata University, Japan;* [2]*University of Tokyo, Japan;* [3]*Meijo University, Nagoya, Japan.*

10:00 **3A.01.06 - THE METHOD OF SOLVING THE INVERSE TASK BY USING ALGEBRAIC POLYNOMIALS FOR LOVE WAVES** - L.S. Zagorsky - *4th Branch of Moscow Pedagogical State University, Lyubertsy, Russia.*

3A.02 ULTRASONIC PROPERTIES OF LIQUIDS, LIQUID CRYSTALS, SUSPENSIONS AND EMULSIONS

08:20 **3A.02.01 - ACOUSTIC SPECTROSCOPY OF AQUEOUS SOLUTIONS OF $MnCl_2$** - O.V. Saenko, O.P. Rudenko - *Poltava State Pedagogical University, Ukraine.*

08:40 **3A.02.03 - CLUSTER MODEL OF A LOW FREQUENCY VISCO-ELASTIC RELAXATION IN LIQUIDS** - B.B. Damdinov, D.S. Sanditov, B.B.Badmaev - *Buryat Scientific Center, Ulan-Ude, Russia.*

09:00 **3A.02.04 - ULTRASOUND DISPERSION IN CORN OIL IN WATER EMULSIONS BY TIME CAUSAL THEORY AND NEARLY LOCAL KRAMERS-KRONIG RELATION** - Tong Jie, J.W. Povey Malcolm - *University of Leeds, West Yorkshare, UK.*

09:20 **3A.02.05 - ACOUSTICAL RELAXATION AND DIELECTRIC/AC CONDUCTIVITY PROPERTIES OF POLY (ETHYLENE GLYCOL) - LITHIUM PERCHLORATE IONCONDUCTING SYSTEMS** - Ya.V .Sperkach[1], V.V. Shilov[2], P. Pissis[3], V.S. Sperkach[4], A.L. Strybulevych[4] - [1]*Poltava State Pedagogical University, Poltava, Ukraine;* [2]*Institute of Macromolecular Chemistry, Kyiv, Ukraine;* [3]*National Technical University of Athens, Greece;* [4]*Kyiv National Taras Shevchenko University, Ukraine.*

09:40 **3A.02.06 - STRUCTURE AND RELAXATION PROPERTIES OF TELEHELIC POLYMERS BASED ON POLY (TETRAMETHILENE GLYCOL)** - V.S. Sperkach[1], V.V. Shilov[2], A.L. Strybulevych[1] - [1]*Kyiv National Taras Shevchenko University, Ukraine;* [2]*Institute of Macromolecular Chemistry, Kyiv, Ukraine.*

10:00 **3A.02.07 - MOLECULAR MECHANISMS OF ACOUSTIC RELAXATION PROCESSES IN PROPYL ALCOHOLS AND THEIR WATER SOLUTIONS** - A.O. Semenov, V.S. Sperkach - *Kyiv Taras Shevchenko University, Ukraine.*

3A.03 ULTRASONICS, QUANTUM ACOUSTICS AND PHYSICAL EFFECTS OF SOUND

08:20 **3A.03.01 - NEGATIVE POISSON'S RATIO: ISOTROPIC SOLIDS, CRYSTALS** - S.P. Tokmakova - *Andreev Acoustics Institute, Moscow, Russia.*

7P.41 - Francoprovenzal and Italian in Aosta Valley: a comparison between two languages - S. Roullet[1], L. Molinu[2] - [1]*Universitè Stendhal Grenoble, France;* [2]*Universitè Toulouse le Mirail / ERSS, France.*

7P.42 - Acoustical analysis of whispered speech - S.T. Jovicic - *School of Electrical Engineering, Belgrade, Yugoslavia.*

7P.43 - Acoustical effects of coarticulation in speech - S. Feijóo, S. Fernández - *University of Santiago Depart. of Appl. Phys., Santiago de Compostela, Spain.*

7P.44 - Perception of Catalan medium vowels by Spanish speakers - J. Carrera-Sabaté[1,2], A.M. Fernández-Planas[1], A. Ortega-Escandell[1] - [1]*Universitat de Barcelona, Spain;* [2]*Universitat de Lleida, Spain.*

7P.45 - Automatic speaker recognition under voice disguise conditions - W. Majewski - *Wroclaw University of Technology,Poland.*

7P.46 - Differential sensitivity of the ear for underwater pure tones - K. Kuramoto[1], S. Kuwahara[1], H. Matsui[1], K. Oimatsu[1], S. Yamaguchi[2] - [1]*Japan Coast Guard Academy, Kure, 737-8512 Japan;* [2]*Yamaguchi University, Ube, Japan.*

7P.47 - Modified discrete wavelet features for phoneme recognition - S. Datta, O. Farooq - *Loughborough University, UK.*

7P.48 - Hearing of one's own speech - T. Nakai, S. Takao, K. Ishida - *Shizuoka University, Hamamatsu, Japan.*

7P.49 - Enhancement of speech as a preprocessing for hearing prosthesis by time-varying tunable modulation filters - J. Baszun - *Bialystok University of Technology, Poland.*

7P.50 - Intelligibility test of a directional hearing aid using a dummy head in noisy surroundings - Y. Arai[1], H. Kondo[2], K. Hikita[2] - [1]*Kanazawa Institute of Technology, Ishikawa, Japan;* [2]*Matsushita Communication Industrial Co., Ltd. Yokohama, Japan.*

7P.51 - Speech reconstruction by using only its magnitude spectrum or only its phase - M. Kazama[1], M. Toyama[2], T. Houtgast[3] - [1]*Acoustic Consultant, Tokyo, Japan;* [2]*Kogakuin University, Tokyo, Japan;* [3]*Amsterdam Free University, Netherlands.*

VOICE CHARACTERISTICS

7P.52 - Vowel formant frequency characteristic of children with hearing impairments - Y. Kato - *University of Tsukuba, Tsukuba, Ibaraki, Japan.*

13:30 *Lunch Break*

KEY NOTES session 2

ACOUSTIC ROLE OF BUBBLES

14:30 **7KN2.01 - Low-frequency sound from a bubble plume** - M.J. Buckingham[1,2], T.K. Berger[1] - [1]*University of California, San Diego, CA, USA;* [2]*Institute of Sound and Vibration Research, The University of Southampton, England.*

ACOUSTIC ATTENUATION

15:00 **7KN2.02 - The absorption of sound in suspensions due to the acoustic wake effect** - I. Gonzalez-Gómez, J.A. Gallego-Juárez - *Instituto de Acústica, CSIC, Madrid, Spain.*

MATHEMATICS AND ACOUSTICS

15:30 **7KN2.03 - Mathematics and acoustics** - M. Schroeder - *Universität Göttingen, Germany and AT&T Bell Laboratories, NJ, USA (ret.).*

16:00 *Closing Ceremony*

Perception of Catalan Medium Vowels by Spanish Speakers

J.Carrera-Sabaté[ab], A.Ma. Fernández-Planas[a], A.Ortega-Escandell[a]

[a]*Laboratori de Fonètica, Div.I, U.B, Gran Via Corts Catalanes 585, 08007 Barcelona, Spain.*
[b]*Universitat de Lleida, Plaça de Víctor Siurana,1, 25003 Lleida, Spain*

Classical studies of Catalan phonetics affirm that medium vowels are more closed in North-Western Catalan than in Eastern Catalan. This study analyses the perceptual response that Spanish speakers had of logatomes from these dialects. Our results suggest that perception is organized according to vowel openness and not lingual anteriority. There are no differences associated to dialect. Identification improves when logatomes are in a carrier phrase. Finally, some consonantal contexts also improve classification.

1. INTRODUCTION

Catalan is a Romance language whose two dialectal diasystems differ as to both their unstressed and stressed vowel systems. Within the stressed vowel system, both diasystems (Eastern –EC, e.g. Barcelona, and Western – WC, e.g. Lleida) present acoustic differences between the openness of the middle vowels [e, ⌀] and [o, ⚐].

Contrary to [5], [1], [8] and [7], [2] demonstrated that the middle vowels in WC are openner than EC.

Human communication is based both in linguistic production and in perception. Studies such as [3] and [6] have shown a lack of coincidence between both controls, and the fact that perception is modified by linguistic experience and other properties of the language.

This paper aims to analyze the perception of Spanish speakers from Lleida to find out whether: 1) they identified some vowel qualities better than others; 2) consonantal context had an influence on identification; 3) presenting the stimulus within a carrier phrase improved identification and 4) stimuli from one dialect were better recognised than stimuli from the other.

2. METHODOLOGY

Perceptual tests were carried out on 30 Spanish speakers born in Lleida aged 16-18 with high passive Catalan competence. Firstly, isolated logatomes (IL), and later, logatomes inserted in a carrier phrase (CP) were presented. Each test contained productions by three native informants from each Catalan diasystem analyzed in [2]. The logatomes had the structure CVC (C1=C2). In them, V=[♍, ☜, □, ⚐] and C=[p, t, s, n, l, r]. Each logatome was repeated twice with a silence in between; every two logatomes the silence lasted three seconds.

A Repeated Measures ANOVA was performed (2x6x4x2). Factors: CP vs. IL; consonantal context; vowel quality, and the dialect of the stimuli (EC vs. WC).

3. RESULTS

Identification score of [♍, ☜, □, ⚐] was 53% when no distinction among variables was applied.

3.1. Variables studied

The distinction between IL (48%) and inserted in a CP (56%) was significant (F=18,202; p=0,000). The best identification score corresponded to [⚐] (55%) and the worst one, to [e] (49%). The declining progression as to correct vowel quality identification is: [⚐>☜>□>♍]. Vowel quality discrimination *per se* is only significant for IL (F=05,612; p=0,001).

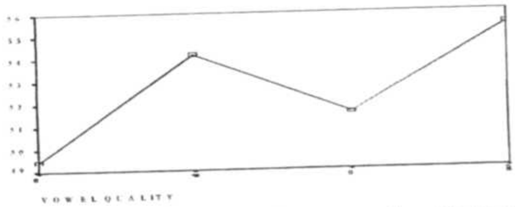


FIGURE 1. Identification according to vowel quality in IL.

The influence of adjacent context in vowel identification is significant both in IL (F=6,484; p=0,000) and in CP (F=3,152; p=0,008). Overall signification is F=3,324; p=0,005. The context making recognition of all vowel qualities easier is [t], and the ones that made it more difficult, [p] and [▭].

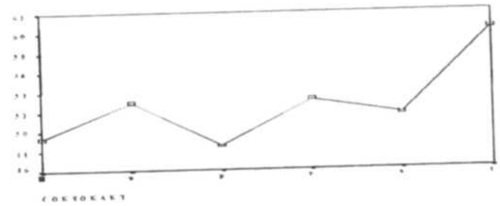


FIGURE 2. Identification according to consonant context.

The dialect did not influence identification neither in IL (F=0,069; p=0,792), nor in CP (F=0,816; p=0,366), nor in both together (F=0,200; p=0,654).

3.2. Variable interaction

1) Phrase x consonant x vowel

This interaction is significant (F=3,130; p=0,000). [♏, □] are better classified next to [t] and worse next to [🖳]. The contexts that usually made identification of [☜, ⊕] easiest are [p] and [🖳] for [☜]; [♦] and [🖳] for [⊕]. [s] makes it hardest to classify [☜]; so does [■] with [⊕].

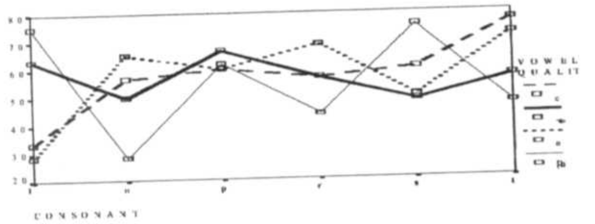


FIGURE 3. Identification of logatomes in CP.

The consonant making it easier to recognise [e, o] is [t] and the ones making it harder, [p] and [🖳]. However, [🖳] and [t] provoke highest recognition scores for [☜]; [🖳] and [s] do so for [⊕], while the consonants making vowel recognition more difficult are [p] for [☜] and [t] for [⊕].

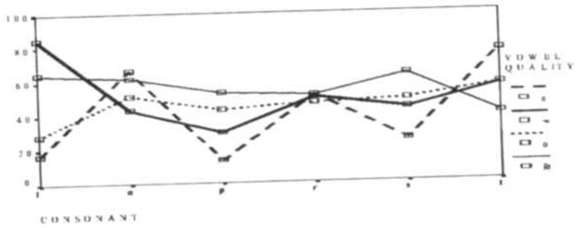


FIGURE 4. Identification in IL.

2) Consonant x vowel x dialect

This interaction is significant (F=2,531; p=0,001). In logatomes uttered in EC, [e, o] are best recognised next to [t] and [n]; [☜], next to [🖳] and [⊕], next to [s].

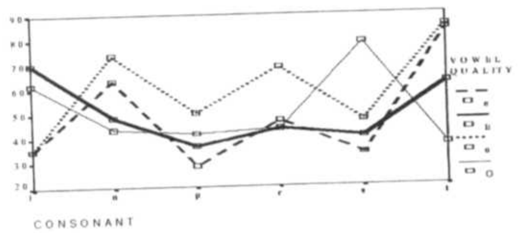


FIGURE 5. Identification of logatomes from EC.

As for the logatomes uttered in WC, the consonantal context making it easier the classification of [☜ ⊕] is [🖳] and the one making it harder, [n]. The consonant improving most the identification of [e o] is [t] for [e] and [p] for [o]. The lateral makes it hardest in both cases.

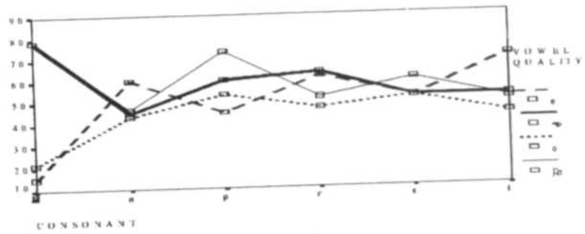


FIGURE 6. Identification of logatomes of WC.

4. CONCLUSION

In general, correct identification scores are not high because of the brevity of the stimuli, as they are logatomes, and because we are dealing with Spanish speakers considering a system different from their own. We conclude that: 1) Identification improves when stimuli are in CP. This coincides with the results in [4]. 2) We have found no differences associated to dialect in identification. 3) Correct vowel identification depends on vowel highness. Thus, open ones are better identified, probably because they are perceived as alien. The following identification progression can be established: [⊕>☜>□>♏]. 4) Contexts improving vowel quality classification are distributed according to vowel highness. [🖳] improves perception of [☜, ⊕] and makes it more difficult that of [e, o]; [t] improves that of [e, o].

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