https://doi.org/10.23925/2176-2724.2022v34i3e56191

Dermatoglyphics applied to Speech Therapy: possibility of interpretation

Dermatoglifia Aplicada à Fonoaudiologia: possibilidade de interpretação

Dermatoglifia aplicada a la Fonoaudiología: posibilidad de interpretación

Cristiane Magacho[*]
Zuleica Camargo[**]

Abstract

Introduction: methodological and technological advances have figured in all areas of Speech Therapy and it would not be different in speech sciences, specifically in acoustic phonetics. Dermatoglyphics is the scientific study of dermatopapillary ridges, found in fingerprints, considered a genetic marker and identifying basic physical abilities, such as strength, speed, endurance and motor coordination. The dermatoglyphic method has been used in the differential diagnosis of some syndromes, and is also an integral part of the vocal quality assessment process and spoken and singing voice professionals. **Objective**: to describe a proposal for a dermatoglyphic analysis script (DAF), which integrates the assessment of vocal quality, both for speaking and singing voice professionals, as well as for speakers who do not use their voice professionally. **Description**: the script of the dermatoglyphic method as a possible tool in Speech Therapy proposes the collection of fingerprints, the identification of the digital patterns and their predominance, the detection of the dermatoglyphic profile, of the digital formula, the sum of the number of lines and deltas of the fingers of the hands and the verification of the potentiated and non-potentiated physical abilities. **Final considerations:** this communication points to the integration of the dermatoglyphic method into the vocal quality assessment process of vocal and singing voice professionals. It also represents a line of inquiry about the focus on the muscular abilities of individuals, not only in the area of voice, but in other areas of activity in Speech Therapy, through the DAF Script – Dermatoglyphics Applied to Speech Therapy.

Keywords: Dermatoglyphics; Voice Quality; Phonetics; Speech Therapy.

* Pontifícia Universidade Católica do Rio de Janeiro - PUC-Rio, Rio de Janeiro, RJ, Brazil
** Pontifícia Universidade Católica de São Paulo - PUC-SP, São Paulo, SP, Brazil

Authors' contributions:
CM and ZC: study's conception and design, data acquisition, data analysis and interpretation; manuscript drafting and revising for key intellectual content.

E-mail for correspondence: Cristiane Magacho - crismagacho@gmail.com
Received: 28/10/2021
Accepted: 26/09/2022

Resumo

Introdução: os avanços metodológicos e tecnológicos têm se apresentado em todas as áreas da Fonoaudiologia e não seria diferente nas Ciências da Fala, especificamente na Fonética Acústica. Dermatoglifia é o estudo científico das cristas dermopapilares, encontradas na impressão digital, considerada um marcador genético e identifica habilidades físicas básicas, como força, velocidade, resistência e coordenação motora. O método dermatoglífico vem sendo utilizado no diagnóstico diferencial de algumas síndromes, assim como parte integrante de processo de avaliação da qualidade vocal de profissionais da voz falada e cantada. **Objetivo**: descrever uma proposta de roteiro de análise dermatoglífica (DAF), que integre a avaliação da qualidade vocal, tanto de profissionais da voz falada e cantada, quanto daqueles falantes que não usam a voz profissionalmente. **Descrição**: o roteiro do método dermatoglífico como possibilidade de uso para Fonoaudiologia propõe a coleta das impressões digitais, a identificação dos desenhos digitais e seu predomínio, a detecção do perfil dermatoglífico, de fórmula digital, a soma da quantidade de linhas e de deltas dos dedos das mãos e a constatação das habilidades físicas potencializadas e não-potencializadas. **Considerações finais**: esta comunicação aponta para a integração do método dermatoglífico ao processo avaliativo da qualidade vocal de profissionais da voz falada e cantada. Representa também uma linha de investigação acerca do enfoque das habilidades musculares de indivíduos, não apenas na área de voz, mas nas demais áreas de atuação da Fonoaudiologia, por meio do Roteiro DAF – Dermatoglifia Aplicada à Fonoaudiologia.

Palavras chave: Dermatoglifia; Qualidade da Voz; Fonética; Fonoaudiologia

Resumen

Introducción: Los avances metodológicos y tecnológicos se han presentado en todas las áreas de la Fonoaudiología y no sería diferente en las Ciencias del Habla, específicamente en la Fonética Acústica. La dermatoglifia es el estudio científico de las crestas dermopapilares, que se encuentran en la huella dactilar, se considera un marcador genético e identifica capacidades físicas básicas como la fuerza, la velocidad, la resistencia y la coordinación motora. El método dermatoglífico ha sido utilizado en el diagnóstico diferencial de algunos síndromes, así como parte integral del proceso de evaluación de la calidad vocal de los profesionales de la voz hablada y cantada. **Objetivo**: describir una propuesta de roteiro de análisis dermatoglífica (DAF), que integra la evaluación de la calidad vocal, tanto para profesionales con la voz hablada y cantada, como para aquellos locutores que no utilizan su voz profesionalmente. **Descripción**: el roteiro del método dermatoglífico como posibilidad de uso para la Fonoaudiología propone la toma de huellas dactilares, la identificación de dibujos digitales y su predominio, la detección del perfil dermatoglífico, de la fórmula digital, la suma del número de líneas y deltas de los dedos de las manos y la verificación de capacidades físicas potenciadas y no potenciadas. **Consideraciones finales:** esta comunicación apunta a la integración del método dermatoglífico al proceso de evaluación de la calidad vocal de los profesionales de la voz hablada y cantada. También representa una línea de investigación sobre el enfoque de las capacidades musculares de los individuos, no sólo en el área de la voz, sino en otras áreas de actuación de la Fonoaudiología, a través del roteiro DAF – Dermatoglífia aplicada a la Fonoaudiología.

Palabras clave: Dermatoglifia; Calidad de la Voz; Fonética; Fonoaudiología

Introduction

Methodological and technological advances have been incorporated to all knowledge areas of Speech Therapy and it would be no different in Speech Sciences, specifically in Acoustic Phonetics.

Dermatoglyphics is the scientific study of dermopapillary ridges, present on the fingertips, soles of the feet, and the palms of the hands. Fingerprints are identified as a genetic marker because the skin and the nervous system both have the same genesis, the embryonic leaflet ectoderm.[1-7]

Fingerprints are considered genetic marks and can indicate enhanced physical abilities such as strength, speed, endurance, and motor coordination, according to the predominance of patterns called Arch (A), Loop (L), or Whorl (W).[1-2] Since the 19th century, dermatoglyphic science has integrated the differential diagnosis of certain genetic syndromes, some in particular that cause communication disorders.[8]

In the last decades, Sports Sciences have been using this type of investigation to recognize specific skills related to the early detection of motor talents and in sports selection.[2-3]

Since 2016, the scientific literature has related dermatoglyphic profiles to acoustic analyses of the voice,[9-12] originally based on Fernandes Filho,[3] aiming to incorporating this method into Speech Therapy.

Although such studies on dermatoglyphic analysis contribute to Speech Therapy as an evaluative resource as well as an aid for therapy, the method is still not widespread, especially for vocal approaches, clinical language, and potentially in the area of orofacial myology.

Thus, the objective of this Communication is to describe a proposal for a dermatoglyphic analysis script, called Dermatoglyphics Applied to Speech Therapy - DAF, which integrates the evaluation of voice quality, for both spoken and singing voice professionals, as well as for those speakers who do not use their voice professionally.

Description

Fingerprint Collection

Fingerprint collection can be done manually, using an ink pad and paper for analysis, or digitally, using a scanner coupled to a computer. In the analog mode, an ink pad is used on all the fingers, in the distal phalanges, which must be covered with ink from side to side, up to the tip of the nails. Then, the fingers must be pressed and rolled against a card, with care not to cause smudges. In turn, digital collection, introduced in the scientific environment relatively recently, can be used by means of a scanner, in which fingers are pressed and their impressions digitized. Then, regardless of the type of collection selected, fingerprints must be analyzed and interpreted.[3]

Dermatoglyphic Analysis, according to Fernandes Filho[3]

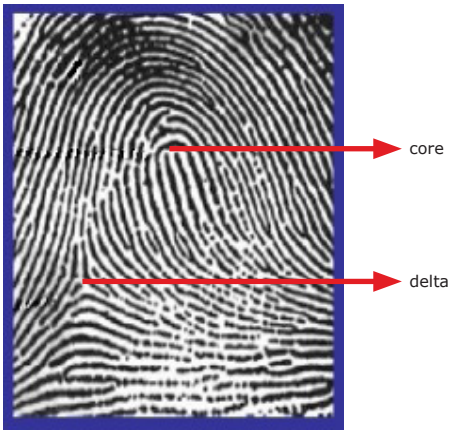
Three types of patterns[1,3] are analyzed: the Arch (A), the Loop (L), and the Whorl (W).

Digital pattern A is characterized by the absence of a core and deltas (Figure 1). It is related to individuals with a genetic predisposition to muscle strength.

Source: www.adrc.sg

Figure 1. Representative image of a fingerprint with the Arch pattern, collected digitally.

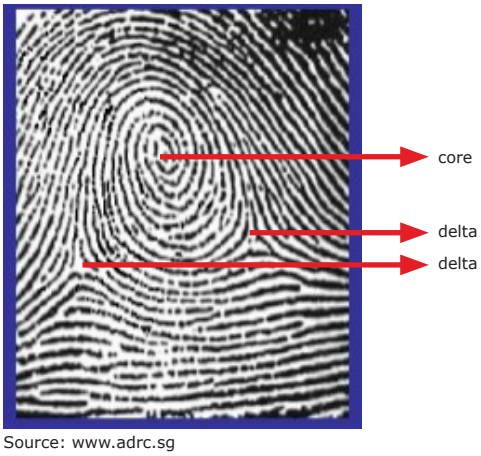
Digital pattern L (Figure 2) has a delta and a core and represents individuals with a genetic predisposition to speed and explosiveness.



Source: www.adrc.sg

Figure 2. Representative image of a fingerprint with the Loop pattern, collected digitally, showing a core and a delta (indicated by arrows)

Digital pattern W (Figure 3) has two deltas and a core and characterizes individuals with a genetic predisposition in terms of both resistance and motor coordination.



Source: www.adrc.sg

Figure 3. Representative image of a fingerprint with the Whorl pattern, collected digitally, showing a core and two deltas (indicated by arrows)

According to the method by Fernandes Filho,[3] the researcher must, initially, identify the predominance (6 fingers or more) of patterns A, L, or W present in the ten fingers. Next, the lines comprising each pattern are counted, identified as Total Ridge Count (TRC) and Delta Score in the fingers (D10).

High TRC indexes point to an increase in muscular resistance[3] and high D10 values indicate an increase in motor coordination.[3,4]

According to Fernandes Filho,[3] a dermatoglyphic analysis correlates information from fingerprint patterns to physical qualities. Skills such as resistance and motor coordination (aerobic profile) are related to the predominance of the W digital pattern, while digital patterns A and L are linked to strength and speed in muscle contraction, respectively (anaerobic profile). There is a possibility that the profile is mixed.

The result of such an analysis refers not only to potentiated physical qualities, but also to non-potentiated ones and the correct prescription of strategies.[3]

Dermatoglyphic analysis with the possibility of incorporation in Speech Therapy

In 2015, a bibliographic review was carried out of works published in Brazil and abroad involving genetic syndromes impacting communication in which the dermatoglyphic method integrated the clinical findings. Of the 29 articles selected, 28 showed altered dermatoglyphics in relation to the control group of the syndromes studied. The results reinforced the contribution of this method in the differential diagnosis of syndromes, leading to the opportunity to prescribe early language stimulation.[8]

In 2016, a study correlated aspects of voice quality – from a phonetic-based perceptual assessment, through the Vocal Profile Analysis Scheme (VPAS) instrument – to dermatoglyphic analyses, in a case report in which the aforementioned method helped in the prescription of strategies for reabsorption of vocal fold nodules.[9]

In 2017, and later in 2022, the characterization of physical abilities associated with acoustic measures, such as fundamental frequency (median f0), intensity (asymmetry), spectral slope (mean), and Long-Term Average Spectrum (LTAS) of the sample of voices of lyrical and musical singers was studied. The results showed correlations between

dermatoglyphic and acoustic indices. The statistical analysis used, cluster analysis, revealed a grouping of the dermatoglyphic profile with the acoustic measurements of the research participants.[10,11]

In 2021, a study was carried out on the dermatoglyphic profile and its relationship with acoustic vocal measures (f0, intensity, and cepstral peak prominence CPP) of teachers and singers. The authors concluded that the anaerobic profile predominated among the voice professionals studied, with an association between this dermatoglyphic profile and acoustic measures. The results showed that dermatoglyphics would complement vocal assessment and allow for a better understanding of the role of voice professionals.[12]

Therefore, based on Fernandes Filho,[3] we present a proposal for a script called Dermatoglyphics Applied to Speech Therapy (DAF), derived from the incorporation of the dermatoglyphic method presented, as a possible tool for various fields of Speech Therapy (Chart 1), consisting of the following steps:

a) Collection of fingerprints performed manually or digitally (Chart 2)
b) Identification of digital patterns and their predominance (A, L, or W)
c) Identification of the dermatoglyphic profile: aerobic, anaerobic, or mixed;
d) Identification of the digital formula that best represents the client/patient:
   * for the Aerobic Profile, the digital formulas can be: W>A+L, W>A, W>L or 10W;
   * for the Anaerobic Profile, the digital formulas can be: A+L>W, L>W, A>W, 10A or 10L;
   * for the Mixed Profile, the digital formulas can be: A+L=W, A=W, L=W;
e) TRC –Total Ridge Count – obtained by counting the nuclear lines of the 10 fingers of the hands;

Chart 1. Dermatoglyphics Applied to Speech Therapy – DAF Script (Magacho-Coelho, Camargo, 2022)

LEFT HAND FINGERS	**RIGHT HAND FINGERS**
THUMB Pattern: D10: TRC:	**THUMB** Pattern: D10: TRC:
INDEX Pattern: D10: TRC:	**INDEX** Pattern: D10: TRC:
MIDDLE Pattern: D10: TRC:	**MIDDLE** Pattern: D10: TRC:
RING Pattern: D10: TRC:	**RING** Pattern: D10: TRC:
LITTLE Pattern: D10: TRC:	**LITTLE** Pattern: D10: TRC:

PATTERN PREDOMINANCE	
DIGITAL FORMULA	
DERMATOGLYPHIC PROFILE	
D10	
TRC	
POTENTIATED PHYSICAL ABILITIES	
NON-POTENTIATED PHYSICAL ABILITIES	

Chart 2. Manual Collection Protocol for Fingerprints(Based on Magacho-Coelho, 2017)

MANUAL COLLECTION OF DIGITAL PRINTS (Magacho-Coelho, Camargo, 2022)

NAME: _____ DATE: _____

THUMB	INDEX	MIDDLE	RING	LITLLE
THUMB	INDEX	MIDDLE	RING	LITLLE

f) D10 – Delta Score – obtained through the number of deltas of each finger. The result is obtained through the formula $\sum L + 2(\sum W)$;
g) Potentiated physical abilities;
h) Non-potentiated physical abilities;
i) Result of the Dermatoglyphic Analysis combined with the result of the Speech Therapy assessment in the training/exercise prescription.

Final Considerations

This communication points to the integration of the dermatoglyphic method to the evaluation process of the voice quality of spoken and singing voice professionals.

It also represents a line of inquiry on the focus of the muscular abilities of individuals, not only in the area of voice, but in other subfields of Speech Therapy, through the script called Dermatoglyphics Applied to Speech Therapy - DAF.

References

1. Cummins H, Midlo C. Fingerprints, palms and soles. New Dover ed. Integral and corr. New York: Dover Publ. 1961.

2. Abramova T, Nikitina T, Ozolín N. The possibility of using finger dermatoglyphics in sports selection. 1994; 3: 10–5.

3. Fernandes Filho J. Impressões dermatoglíficas: marcas genéticas na seleção dos tipos de esporte e lutas [Tese]. Moscow. Russian Institute of Scientific Research on Physical Culture and Sports; 1997.

4. Machado C, Rosa FMM, Linhares, RV, Quaresma JCV, Fernandes Filho, J. Análise do perfil da composição corporal e dermatoglífico de mulheres obesas mórbidas. RBONE. 2019; 13(77): 3-13.

5. Luna, AL, Linhares, RV, Costa e Silva, GV, Fernandes Filho, J. Antropometría, coordinación motora, dermatoglifia y el proceso de alfabetización de los niños. Revista de Investigación Cuerpo, Cultura y Movimiento. 2021; 11(1): 1-20

6. Nenenko ND, Gimaev, AA. A study of dermatoglyphics and somatometric indicators of water polo players of the teenage period of various playing roles. International Research Journal. 2019; 5(83): 85-8

7. Mukherjee, DP. Inheritance of total number of triradii on fingers, palms and soles. Ann. Hum. Genet. 1966; 29: 349-53.

8. Magacho-Coelho C. Distúrbios da comunicação em síndromes genéticas: um estudo de revisão sobre possíveis contribuições da dermatoglifia. Intercâmbio. Revista do Programa de Estudos Pós-Graduados em Linguística Aplicada e Estudos da Linguagem. 2015; 31: 37-54.

9. Magacho-Coelho C; Ferrnandes Filho J; Camargo Z. Dermatoglifia e qualidade vocal. In: Camargo ZA. Fonética Clínica. São Paulo: Pulso Editorial. 2016.

10. Magacho-Coelho C. Cantores líricos e de musicais: dados dermatoglíficos e acústicos [Tese]. São Paulo (SP): Pontifícia Universidade Católica de São Paulo. Programa de Linguística Aplicada e Estudos da Linguagem; 2017.

11. Magacho-Coelho C; Camargo Z. Dermatoglyphic and acoustic analysis of singing voices: a multiple case preliminary report. Rev. CEFAC. 2022; (24)2: e6821.

12. Santana ER, Oliveira P, Magacho-Coelho C, Lopes L, Sacramento LSC. Characterization of dermatoglyphics profiles and its relation to acoustic measures in voice professionals. JVoice. 2021; 0(0): 1-7.