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ADAPTATION OF PERMANENT MAKEUP METHODS FOR LEFT-HANDED SPECIALISTS: WORKPLACE ERGONOMICS AND SHADING FEATURES

Summary. *The article contains a study of the professional aspects of the work with permanent makeup artists concerning left-handed individuals. An analysis of ergonomic and educational problems left-handed workers come up against will be conducted in this study, along with recommendations for adapting workplaces and training methods to enhance their professional skills. The urgency of this work lies in the creation of conditions for the successful professional activities of left-handed craftsmen, since most methods and equipment were traditionally oriented towards right-handers, which added additional difficulties in both the process of training and work. The novelty of the study lies in a systematic consideration of biomechanical characteristics of left-handed specialists related to permanent makeup, as well as suggesting practical amendments both to the workspace and training methods that can help improve the quality of work and reduce physical stress. The major conclusions are that left-handed experts find it tough to arrange the place of work and also to learn methods intended for right-handers, which requires personal adjustment and change of regular techniques. This information will help permanent makeup artists, teachers, and training pros, along with beauty salon owners, who want to make a welcoming work setting for left-handed workers.*

Key words: *permanent make-up, left-handed specialists, workplace ergonomics, shading, carpal tunnel, occupational diseases, training of left-handed specialists, adaptation of the workspace, individualized methods.*

Introduction. Cosmetic tattooing or permanent makeup is the cosmetic procedure where pigment is implanted into the skin's upper layers through injection to achieve long-lasting makeup that mimics natural facial features—eyebrows and lines at the lips or even eyeliner [1]. This technique provides long-lasting aesthetic results while enhancing the natural expression of the face, thus it attracts many clients who prefer not to spend time on daily make-up application. The procedure requires artistry and comes with a requirement for special skills as well as equipment, which must be utilized by the master.

A permanent makeup artist has become a very popular profession, not just because of the demand for the service, but also because the specialists can meet the individual needs of clients and offer them solutions. The growing interest in this field is evidenced by an increase in training and certification programs aimed at preparing qualified personnel. The global permanent makeup market size was valued at USD 152.4 million in 2024. The market is projected to grow from USD 162.9 million in 2025 to USD 277.8 million by 2032, exhibiting a CAGR of 7.9% during the forecast period [10]. On the other hand, this profession implies adaptation to specific working conditions, equipment, and techniques largely meant for right-handed workers. This underscores the need for deeper investigation into professional aspects, particularly for those groups of artisans whose characteristics may pose additional difficulties during training as well as in work.

Materials and Methodology. The adaptation of permanent makeup techniques for left-handed artists has been done based on ten sources, clinically researched and elaborated on ergonomics, motor skills, and pedagogy. The creation of the theoretical base was data common permanent makeup

complications [1] that stressed the importance of precise application techniques and studies on carpal tunnel syndrome [2] that updated ergonomic issues for specialists whose work involves repetitive movements. Works on hatching techniques [3] and client preferences [4] have proven that the quality of the outcome does not only rely on the skill but also on the suitability to the physiological characteristics of the master.

The study was conducted by methodological triangulation of comparative skills analysis and systematic review of educational strategies. Data obtained from Bhandari et al. [5], regarding vestibular function differences in right-hand and left-hand individuals, and the study conducted by Dexheimer and Sainburg [9] on non-dominant hand precision task performance provide evidence for identifying key characteristics of hatching in left-handed experts: movement mirroring inclination and increased load on the wrist joint. Content analysis of Kim [3]and Lee, Kim [4] indicated that traditional teaching approaches meant for right-handed individuals create hurdles for left-handed instructors in mastering the hair stroke technique, which slows down the process. Synthesis of data from studies by Gilbert et al. [6] and Luo et al.[7], confirmed that adaptations of training programs (mirror demonstrations and customized training) improve coordination while reducing cognitive load.

Results and Discussion. Regarding workplace ergonomics, the positioning of the specialist relative to the client matters a lot for left-handed professionals. The positioning of left-handed professionals ideally would be to the left side of the client, since there is a need for convenient access for the left hand to working areas such as eyebrows, lips, or eyelids. Proper workspace organization enables reduced physical strain and lowers the risk of injuries related to work, such as carpal tunnel syndrome; hence, a sustainable quality of work will be achievable. Carpal tunnel syndrome results when the median nerve gets compressed within a certain area at wrist level (see Figure 1: flexor tendons, carpal bones, transverse carpal ligament) and leads to symptoms including

tingling, green regions in de imnumbnes, bones, and weakness in areas it supplies. In left-handed artists of permanent makeup, the risk for this syndrome increases due to the loads that get repeated on the dominant hand: prolonged fixation in a pronated position for the hand, microtraumatization of the median nerve by needle work, and the need for precise movements all contribute to narrowing of the carpal tunnel. This will lead to ischemia of a nerve, followed by axonal degeneration and progression of symptoms that can incapacitate professional activity and will require either ergonomic adjustments or surgical decompression.

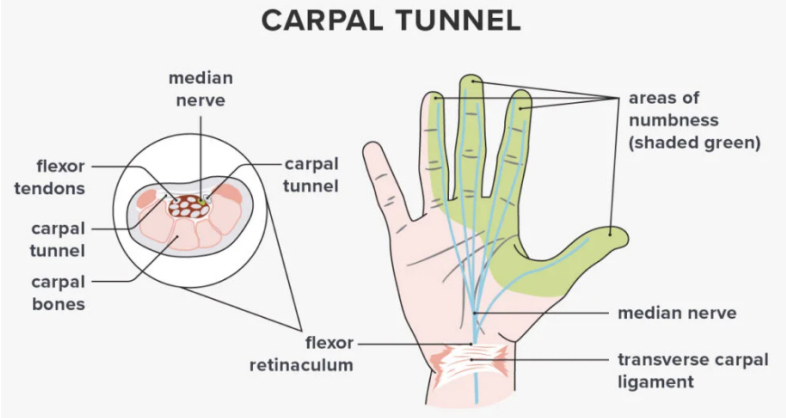

Fig. 1. Carpal tunnel syndrome [2]

Working on the client's right side creates great problems for left-handed artists. In this setup, the left hand becomes positioned awkwardly, thus increasing tension in the muscles and leading to fatigue, which comes on fast. Then, the accuracy of the movegetset dull; it can show itself in uneven lines, asymmetry other technical flaws that spoil the result. Such problems not only make it trickier to do the job but also raise how likelihood of mistakes happening, and that cannot be accepted where there is such high responsibility as in permanent makeup.

The setup of equipment at the workplace of a left-handed permanent makeup artist is essential to ensure comfort and efficiency of work, which will in turn reflect on the quality of the procedure performed. The convenient placement of the control pedal, table with materials, and wires from the device

helps to minimize unnecessary movements and distractions, which is most important in a high-precision profession. The pedal should be positioned for easy pressing with the left foot, corresponding to the natural body position, while working on the client's left side. Ergonomics is taken into consideration here as well as physical strain reduction during long sessions. A table with materials, pigments, needles, napkins, and other tools must be placed on the left side of the master for quick and effortless reaching with the left hand to reduce search time and keep a sterile work area. Wires from the implement should be arranged in such a manner that they do not cross the work area and do not hamper the movements of the left hand; this will prevent confusion and possible interference during the process of makeup application. An example of the workplace is depicted in Figure 2, and a summary table of ergonomic factors for the workplace is given in Table 1.

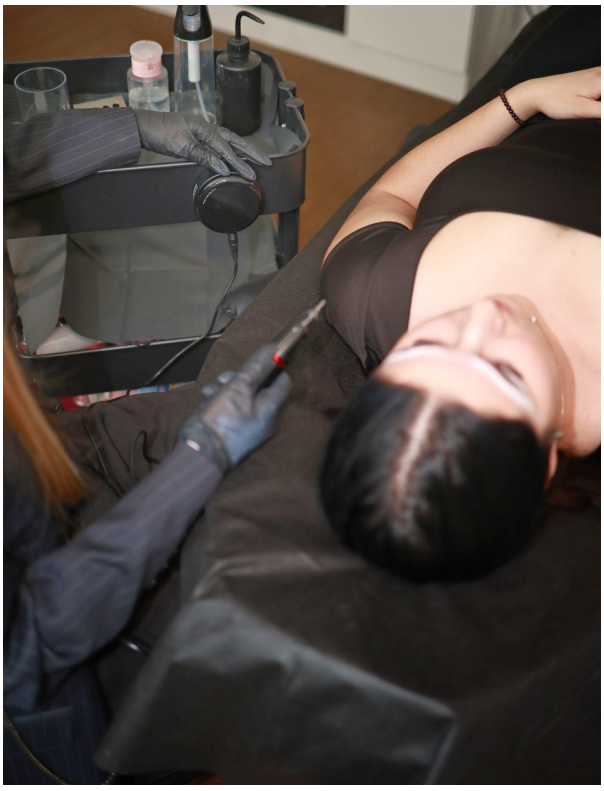

Fig. 2. An example of organizing a workplace for a left-handed master (shot by the author)

Table 1

Ergonomic Workplace Adaptation for Left-Handed Permanent Makeup Artists

Factor	Description
Workplace Positioning	Left-handed artists should position themselves to the left of the client for easy access with the left hand.
Pedal Positioning	The pedal should be moved to the left side to allow control with the left foot, reducing physical strain.
Material Placement	The material table should be positioned on the left so that left-handed artists can easily reach tools without unnecessary movement.
Cable Management	Cables from the equipment should not cross the work area to avoid interfering with the left hand's movements.
Health Risks	Incorrect hand positioning and non-adapted equipment increase the risk of professional injuries, such as carpal tunnel syndrome.

Left-handed workers typically require reconfiguration of standard work elements, rearrangements that have initially been configured for right-handed workers. For example, typical salons keep pedals and materials tables right-hand oriented, left-handers have to set the space according to them. Left-side placement of the pedal gives much more comfortable positioning that would not lead to any awkward movements affecting concentration or precision.

Workplace ergonomics becomes a major factor in the comfort and efficiency of left-handed permanent makeup artists, particularly those who work from a position of relative discomfort in most standard salon setups. Machines usually have their pedals placed on the right side, convenient for right-handed technicians but awkward for left-handed artists, thus compromising their control over the application and adding unnecessary bodily stress. Adjustments may include moving the pedal to the left side so that it can be operated with the left foot by the technician, corresponding to natural body alignment. Many salons either do not have or are unwilling to rearrange the space according to left-handed workers; hence, many opportunities are lost due to this lack of awareness and rigidity concerning work environment organization.

Shading and drawing in permanent makeup are very key parts of the work, mostly for left-handed artists. Their normal ways of moving are not the same as the regular methods made for right-handed workers. Left-handed masters usually toil from right to left because they use the biomechanics of their main hand. This method lessens the chance of smearing the sketch since their hand does not go over the lines that have already been drawn—this is very crucial when working in delicate areas like eyebrows or lips.

Adapting techniques for the left hand becomes very crucial in the professional practice of left-handed artists in permanent makeup, as all techniques and tools were initially developed for right-handed professionals and therefore pose extra challenges to left-handers. The major challenge that left-handed artisans encounter is that the preparation of sketches must be done with great precision and control; hence, the preparations should not blur and should have even strokes, which demands that they adapt their movements from right to left. This, in turn, has to be mirrored in standard techniques, hence increasing the time required for training and stressing the need for additional practice. The author's experience of the abovementioned is presented in Figure 3.

Fig. 3. Example of the technique for the left-handed artist in permanent makeup (shot by the author)

Pressure control is one of the major factors in the technique of permanent makeup because it directly influences the quality and longevity of the outcome. The needle angle and pressure used for injecting pigment into the skin should be precisely controlled so that color does not diffuse too deeply or become uneven. The master should ensure stable pressure along with trajectory accuracy to avoid asymmetry and unevenness, which can later ruin the aesthetic effect [4].

Training left-handed permanent makeup artists poses several challenges, particularly when it is conducted under the aegis of right-handed specialists. This happens because of the difference in biomechanics, hand movements, and the orientation of standard techniques, which were developed primarily for the needs of right-handed professionals [5]. Standard permanent makeup techniques like shading usually move from left to right, which is natural and comfortable for right-handed artists since they can easily control the tool and avoid smearing the sketch; left-handed individuals have to mirror these movements or change their hand position to achieve similar ease and accuracy, requiring additional effort and time, thus making their path toward professionalism slower.

The online training course for permanent makeup has a very good opportunity to acquire the skill professionally, but left-handed artists have to face many difficulties due to the organization of almost all courses. One major problem is the unavailability of materials adapted according to the biomechanical characteristics of left-handed individuals. The online programs mostly consider right-handed professionals for their demonstrations of techniques, directions for tool and equipment placement, and general learning experience structure. Left-handed individuals have to rethink by themselves and adapt all methodologies that come with an additional time and cognitive cost. For example, during such procedures as shading or blending, left-handed artists are compelled to do the actions in a mirrored manner, which may cause uneven lines or an improper distribution of pigment. It thus accounts for not only

reducing the effectiveness of training but also increasing the errors that can be committed. This underscores the need for materials to be developed that specialize in left-handed individuals and their characteristics.

Another major challenge is the challenge of visually perceiving the techniques shown by right-handed masters. Visual learning is very important in learning permanent makeup because it enables one to see exact hand movements, tool angles, and the sequence of actions. But for left-handed people, these demonstrations become quite unnatural and hard to replicate because their natural motor skills differ from those of right-handed people. Studies in visual perception have confirmed that mirroring actions can create additional cognitive impediments when learning tasks requiring high coordination [7]. In permanent makeup, this can be expressed in troubles with the proper execution of strokes or shading, which has a direct negative impact on the quality of the final work. To solve this issue, left-handed learners have to either search for unique classes that cater to left-handers, or alone understand what they observe, which needs much effort and creativity. So, the absence of custom visual material and particular demos makes the learning process for left-handed experts much harder, stressing the need for more inclusive educational methods.

In preparing left-handed permanent makeup artists, adaptations are strongly recommended, as the peculiarity of their motor skills adds some extra challenges in mastering the profession. Therefore, finding mentors who will take into account left-handed specifics is one of the key factors for successfully training such specialists. Most educational programs and courses in this area are oriented toward right-handed masters, and this is reflected in the way they demonstrate techniques, organize the workspace, and general teaching methodology. This fact forces left-handed specialists to rethink all information received in school on an impersonal basis, which slows down professional development. Mentors who can adapt their approach greatly help in overcoming these challenges. They may offer mirror-image demonstrations of movements

or change the angle of an instrument to suit natural left-hand motor skills. For instance, while teaching shading, the tutor can demonstrate right-to-left movements, which can be mastered with a lesser degree of mistakes and with more accuracy. Studies also prove that individualized strategies toward the traits of students lead to more effective learning as well as increased motivation [8]. Thus, the collaboration of instructors who are willing to adjust their teaching programs to address the needs of left-handed students becomes greatly instrumental in their professional success.

Left-handed people often have to develop a personal style because standard techniques do not conform to their natural patterns of movement. This shading technique would ensure that the left-handed artist does not experiment with the stroke directions toward achieving a smooth gradient, losing control, or comfort. Ergonomic studies show that naturally using the dominant hand increases accuracy and decreases fatigue [9]; in this regard, it is most applicable for tasks requiring high detail, like permanent makeup. Technique development on an independent basis, allowing convenient movement direction, assists left-handed artists in overcoming professional barriers and simultaneously allows for attaining a high degree of proficiency, resulting in an aesthetically pleasing and high-quality outcome.

Conclusion. The study confirms that left-handed artists need the adaptation of permanent makeup through an integrated ergonomic-technical-educational approach. The major issue remains to be organized for a workspace originally intended for right-handed specialists. For left-handers, critical positioning to the client's left is a must to achieve natural biomechanics of movement and reduce risks related to work, like carpal tunnel syndrome, as well as make procedures more accurate. Rearranging equipment-foot control, and instrument wires secured in a convenient area reduces physical strain as well as mistakes due to inconvenient access to materials.

The technique of doing permanent makeup by left-handed artists requires adaptation of the standard techniques in such a way that shading should be done from right to left to avoid smearing the sketch, as well as ensuring uniformity of lines and control over the depth of pigment introduction. This is because specialized tools for left-handers are not available, which forces artists either to modify standard equipment or search for alternative ones, increasing time and cost.

The training of left-handed professionals poses some extra difficulties, particularly in a setting where right-handed trainers and online courses dominate. The mirrored demonstrations, non-adapted visual materials, and differences in motor skills create some cognitive barriers to learning the techniques that must be overcome. An answer to this problem is the collaboration with trainers willing to adjust their approach, as well as the creation of educational programs considering the biomechanical characteristics of left-handers. The self-practice of movements in a comfortable direction and trials with angles of inclination of the tool aid in developing an individual professional style.

The importance of adaptation is marked not only by improving the comfort of the craftsmen but also by the direct effect it has on the quality of services. Prospects for the development of the area are linked with bringing in left-handed equipment, creating specialized courses, and raising industry awareness regarding minority needs.

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