

**The Education of Musical Thinking Through the Hand
According to Marie Jaëll (1846-1925)**

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A dissertation
submitted in partial fulfillment of the
requirements for the degree of

Doctor of Musical Arts

University of Washington

2017

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Program Authorized to Offer Degree:

Music

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Abstract

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Music

Marie Jaëll's (1846-1925) remarkable career and unique contribution to music deserves far more attention than it currently receives. Jaëll was an acclaimed pianist and a prolific composer, who Liszt rightly described as having "*the brain of a philosopher [and] the fingers of an artist.*" She was the first pianist to perform all Beethoven sonatas in Paris and the first woman to enter the Société Nationale de Musique, founded by Saint-Saëns and his circle in 1871 to promote French contemporary music. Most notably, she distinguished herself by her forward thinking as she became the very first piano pedagogue to become aware of the importance of providing a

scientific basis for piano teaching. Aided by French physician Charles Féré, Jaëll dedicated decades to physiological research, determined to uncover relations between touch, sound and musical thinking. She believed that pianists' hands are a vehicle for creative intelligence and have a potential and artistic destination far more superior than the one reduced by our unconscious and repetitive daily gestures. To Jaëll's perspective, musicians are neurologists who need to combine the act of creating beautiful sound with the physiological aspects of tactile, auditive and visual senses, of which touch is the pathway.

Acknowledgements

I wish to express my profound gratitude to my advisor, Dr. Terry, for her wonderful guidance and continued support throughout the writing of my thesis. I would like to extend my sincere appreciation to my committee members, Melia Watras, Craig Sheppard and Leroy Searle for their advices and enthusiasm for this topic.

Merci à Lara Erbès pour avoir éduqué aussi patiemment ma passion pour le piano enfant, et m'avoir initiée sans que je m'en rende compte à la philosophie de Marie Jaëll.

Merci à Dr. McCabe, Mack McCray et Masako Hayashi-Ebbesen pour avoir continué à ouvrir de nouvelles portes.

Merci à mes élèves, ma constante source d'inspiration et d'apprentissage.

Merci à Steven, K. Kruger, Emilie, Krys & Olive, Helen, Kristina, Nina, Natalie, Marie Algrain, Alessandra et Elise pour leur aide, présence et amitié tout au long de ce doctorat, de loin comme de près.

À Spencer, à mes parents, et à la mémoire de mes grand-mères.

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A. INTRODUCTION

The infinite potential of music allows for the constant development of new methods of learning and performing music. Since there are many different paths to develop musical talent, very few agree on one particular pedagogy. Given the diverse ways one can make and teach music, it is unsurprising that many contend with this endless potential by emphasizing subjective goals in how they teach and play. Yet, by compartmentalizing their musical understanding, they run the risk of neglecting higher possibilities of music.

Among the numerous pedagogical theories in existence, Marie Jaëll's unique focus on the physiological training of the hand as a tool of perception deserves far more recognition than it currently has. As one of the first scholars to apply scientific and analytical methods to the development of musical training techniques, Jaëll was a pioneer who is little-known outside of Europe, due to the lack of sources in the English language. Jaëll aimed to integrate human motor mechanisms with that of the musical, to create a path for understanding music that required the development and harmonization of all musical faculties: the auditive, tactile, intuitive, mental, and visual. Jaëll believed in both the perfectibility of the human organism and of musical language; in doing so, she was convinced that music could be refined and developed by a deeper understanding and refinement of one's own physiological functions. By integrating music with a knowledge of the human hand, Jaëll saw a path to understanding music that allowed for the development and harmonization of all musical faculties: the auditive, tactile, intuitive, mental, and visual.

Simply stated, Jaëll conceived that anyone driven to perfect their physiological potential would be able to deeply absorb concrete elements in order to shape external gestures of the musical language and produce music in an effortless and natural way. In this way, Jaëll's physiological perspective was an egalitarian one; one less dependent on innate talent and more on studious refinement of common physiological aptitudes. Although Jaëll's approach is mentally demanding, it is not intellectually pompous because it allows anyone to develop their musical instinct into a more thoughtful and accurate way, without falling into a mindless pattern of mechanical playing.

Jaëll believed that the beauty of sound, the musical ideal that many nineteenth-century artists devoted themselves to pursuing, did not arise from pure chance, nor was it the product of a musician's innate or divine gifts. Rather, the beauty of sound depended on the symbiotic relationship between the physiological faculties and musical sensibility; in the case of the piano, between the hand and the music itself. Accordingly, Jaëll's primary endeavor was to show how this connection could operate in practice. In an era dominated by traditional piano methods that combined mechanical repetition and an ephemeral use of instinct, Jaëll's ambition to create a new way of learning music based on the real possibilities of brain learning was very ahead of her time. She was convinced that combining art and science helped foster a better understanding of the physiological mechanism for true musical expression.

As Jaëll looked for ways to perfect musical physiology, she realized that the most powerful means to facilitate cognition was derived from the education of the hand. Because hands are the most subtle agents of our sensitivity, refining the physiology in relation to our mental function helps better shape the most artistically accurate world of sounds. A physiological

approach to developing musical intuition, that is achieved through an understanding of the human hand, creates musical expression that can reach beyond mere mechanical accuracy, allowing for a cognitive reflection of music.

This dissertation argues for a greater appreciation of Jaëll's influential research, especially to the English-speaking audiences who are likely unfamiliar with her works, due to an absence of English language translations. I do not intend to comprehensively reproduce Jaëll's complex publications, although I have tried to preserve Jaëll's unique speaking style when translating direct quotes. Rather, I focused on some key aspects of Jaëll's work, hoping to raise curiosity by shedding some light on her most insightful discoveries and to argue for a greater application of her method to the modern corpus of musical knowledge.

The first section of this dissertation depicts Jaëll's journey as a musician at the core of the piano century, her ascension as a pianist, and her interactions with some of the most important figures of her time, such as Liszt, whose influence was significant for Jaëll as she decided to devote herself to physiological research. The second section concentrates on Jaëll's employment of a more scientific approach, examining in detail her first milestone, *La Musique et la Psychophysiologie*,¹ which contains insights and observations on the role of art that resonate today. The third section presents some of the main discoveries Jaëll articulated in her publications. At the time, Jaëll was closely working with a Parisian neurologist and student of

¹ Jaëll, Marie. *La Musique et la Psychophysiologie*. Paris: Alcan, 1896.

Charcot,² Charles Féré, who was studying prehension in the hand when he read Jaëll's *La Musique et la Psychophysiologie* and instantly offered his collaboration. Their partnership was a model of the interdisciplinary approach, and reflects a productive alliance of music and science that sought to help art leave its comfort zone and utilize tradition and instinct in a more progressive way. The final section proposes some concrete applications of Jaëll's findings.

Among Jaëll's lengthy publications, I have selected and examined the most principal ideas for the purposes of my project. By understanding Jaëll's pursuits through these selections, I will argue for the necessity to perfect musical teaching methods through the harmony of mental faculties and hand physiology.

² Jean-Martin Charcot (1825-1893) was a Professor of the Pathological Anatomy at the University of Paris where he lectured on diseases of all organs. Particularly interested in neurological symptoms, he developed the Salpêtrière hospital into a main center for neurology. In addition to contributing to the advancement of neurology, for instance by exploring the brain's vascular supply more in depth, improving the diagnosis of multiple sclerosis and Parkinson's disease, making a distinction between nervous disorders and creating rehabilitation clinics for his patients, he was an acknowledged Professor who taught students who would become significant medical figures, such as Freud.

B. ARTISTIC TRAJECTORY

1. First Steps and Sounds

Deep in a farmhouse in the Alsatian countryside, Marie Jaëll found herself fascinated with the world of sounds before even turning six. She was born in Steinseltz on August 17, 1846, only a few miles away from the German border, in an area imbued with a strong rural tradition and a sense of local independence. Alsace was part of the Kingdom of France at the time, and tension with Germany still existed, exacerbated by Alsace's proximity with the border. This conflict found its way into Jaëll's environment as she grew up: the simple view of a mailman making his daily delivery while wearing the German uniform constantly infuriated Jaëll's father, Georges Trautmann.³

Most of the recollections from Jaëll's childhood are attributable to Ms. Hélène Kiener, Jaëll's cousin, who had in her possession Jaëll's manuscripts, journals, notebooks, until she donated them to the Bibliothèque Nationale Universitaire in 1976.⁴ In 1952, twenty-seven years after her cousin's death, Kiener published a full-scale biography on Jaëll containing lengthy excerpts from these primary sources.⁵ The following biographical elements are only intended to

³ "La simple vue du facteur, portant l'uniforme du conquérant, le mettait en fureur." Kiener, Hélène. *Marie Jaëll, 1846-1925; Problèmes D'esthétique Et De Pédagogie Musicales*. Bibliothèque D'esthétique. Paris: Flammarion, 1952. p. 20.

⁴ The National and University Library is located in Strasbourg, France. The abbreviation BNU or BNUS, Bibliothèque Nationale Universitaire de Strasbourg, will be used in this paper.

⁵ Kiener, Hélène. *Marie Jaëll, 1846-1925; Problèmes D'esthétique Et De Pédagogie Musicales*. Bibliothèque D'esthétique. Paris: Flammarion, 1952.

create a contextual setting, since Jaëll's musical trajectory is inextricably linked to the emergence of her physiological findings.

Contrary to most child musical prodigies, Jaëll grew up in an environment where music was not dominant in a conventional sense. Her father was known in the community as an intelligent and well respected but introverted man, and was elected mayor of Steinseltz in 1861. A farmer open to progress, Georges Trautmann bought the first agricultural machinery for the small village, and as the only newspaper subscriber in the village, he provided updates about French politics, which he attentively followed. On the other hand, his wife Christine Schopfer came from a family who was regarded as eccentric and unbound by community norms. Described by Kiener as wise, energetic and bright, Mrs. Trautmann was equally fluent in French and German and played an important role in the village, regularly gathering farmers at her house for reading and open discussion nights.⁶ Similarly, Marie Jaëll's older sister, Caroline, was equally driven by a desire to educate herself: she spoke five languages, and created quite a stir in Steinseltz when she married a visiting doctor from New York and moved across the Atlantic Ocean to live with him. Her brother Georges, on the other hand, was a "*farmer in the strictest sense of the word,*" and devoted his time to cultivation.⁷

As a member of this traditional, yet atypical family, Marie Jaëll grew up in a relatively secluded rural life. Although her parents were not musicians and did not own an instrument at

⁶ "*La mère de Marie Trautmann, Christine Schopfer, était issue d'une famille qui passait pour originale. Les Schopfer ne s'habillaient pas comme tout le monde et faisaient toutes choses à leur guise. C'étaient de solides buveurs qui, paraît-il, aimaient la lecture. Mme Trautmann, femme avisée, énergique et vive, parlant avec une égale facilité le français et l'allemand, jouait un certain rôle dans le village. Pendant les longues soirées d'hiver, elle réunissait chez elle les paysans pour des veillées de lectures et de discussions.*" Ibid, p. 20.

⁷ "*Le fils de la maison, Georges, était un paysan dans le vrai sens du mot. Très travailleur, il s'occupait exclusivement de la culture.*" Ibid, p. 20.

home, Jaëll became receptive to the natural orchestra she heard around the valley of Steinseltz at a very young age. *"Rustling leaves, the wind in the trees, the murmuring of a brook, the birdsongs enchanted her. She walked the fields, vineyards and woods, and liked above all to sit in the horse-drawn carriage to collect fodder with her dad at nightfall."*⁸ She also loved listening to the village's bells, and hated when the bell-ringers interrupted the sound abruptly without giving it enough time to resonate. Kiener recalls the anecdote that while she was sweeping the street, like any Saturday evening, *"she would often stop in the middle of her chores to listen intently to the bells ringing; then suddenly run towards the church, take the bell cord in hand, and scold the bell-ringers for not letting the sound die away gently. She couldn't stand the abrupt cessation of the ringing."*⁹ These pastoral depictions are echoed throughout Jaëll's workbooks, where in lengthy pages of reflection and research, she discussed a tree's rhythmic structure from her window at her Trocadero apartment in Paris, or a walk in the Jardin des Plantes. Jaëll undoubtedly viewed these experiences as sources of musical understanding.

One of the primary musical influences in Jaëll's early childhood was the music played by gypsies who frequently made a temporary stay in Steinseltz on clear days. Following them to listen to their instruments, she once threatened her parents to run away with them if *"they did not immediately buy a 'music' for her."*¹⁰ Years later, as she recalled the anecdote, she confessed to

⁸ *"Le bruissement des feuilles, le vent dans les arbres, le murmure du ruisseau, le chant des oiseaux la ravissaient. Elle parcourait les champs, les vignes et les bois, et aimait, par dessus tout, s'asseoir dans le grand char pour chercher le fourrage avec son père, à la tombée du jour."* Ibid, p. 21.

⁹ *"Elle s'arrêtait au milieu de son travail pour écouter avec recueillement; puis soudain s'élançait vers l'église, prenait elle-même la corde en main, reprochant aux garçons de ne pas laisser la sonorité s'éteindre doucement; l'arrêt brutal de la sonnerie lui était insupportable."* Ibid, p. 21.

¹⁰ *"Lorsqu'ils jouaient de leurs instruments, Marie en était fascinée. Elle les suivait partout et un jour, rentrant à la maison, elle déclara à ses parents que s'ils ne lui achetaient pas immédiatement 'une musique' elle se sauverait avec les bohémiens. 'Je l'aurais fait sans hésiter' affirmait-elle encore plus tard en évoquant ce souvenir encore vivant."* Ibid, p 22.

her cousin that she would have done it with no hesitation. Around the age of six, she persistently begged her parents to get her a piano. Her parents eventually capitulated: her father bought and dragged a piano from Haguenau back to the family house via a cart harnessed to his horse, and her mother hired a piano teacher in the nearby village, Rott. Instantly, Marie Jaëll subordinated herself to her piano studies with a devotion unusual for a young child, to such an extent that in the rare instance in which she pursued other interests, she was quickly filled with strong feelings of guilt. Once, when Jaëll missed a concert she was supposed to attend with her mother in Wissembourg because she was playing with other children, she became despondent because she felt she had betrayed *"what she loved the most."* Marie could not be consoled, *"so grave and irreparable did her error seem, and all her life she would recall the intensity of this childhood grief."*¹¹

Jaëll's early devotion is all the more incredible because she had absolutely no family pressure to become a musical prodigy. Although there was no musical background in her environment, music came to her effortlessly and naturally. This is a fascinating but paradoxical fact, given that Jaëll spent the last decades of her life attempting to provide a scientific complement to her innate musical intuition in order to elaborate on the science of the touch.

¹¹ *"Devant un jour accompagner sa mère à Wissembourg pour assister à un concert, Marie, qui s'amusait avec des enfants de son âge, laissa passer l'heure du départ. Puis au milieu des jeux, s'apercevant subitement de son oubli, elle fut prise d'un violent désespoir: il lui semblait avoir trahi ce qu'elle aimait le plus. On n'arriva plus à la consoler, tant sa faute lui parut grave et irréparable, et toute sa vie, elle se rappellera l'intensité de ce chagrin d'enfant."* Ibid, pp. 22-23.



Georges Trautmann, document BNU Strasbourg.



Christine Schopfer, document BNU Strasbourg.



Birth house, Steinseltz, document BNU Strasbourg.

2. Formative Years

Jaëll's parents quickly realized the necessity for her to expand her musical horizon. At seven, and despite Mr. Trautmann's lack of affinity for the German, Marie Jaëll was allowed to study with F.B. Hamma, a renowned piano teacher in Stuttgart. Due to the absence of dated letters, there is little evidence from his time period. Yet Kiener recalls how Jaëll's mother accompanied her daughter on every musical trip, intending to compensate for the absence of formal education by instructing her as well as she could.¹²

Completely devoted to her piano career, Marie Jaëll never attended school. Instead, she performed her first concerts at the age of eight, which were received with immediate praise, including from renowned musicians such as Moscheles, who attended her first Stuttgart concert. After hearing Jaëll perform two of his Etudes, op. 70 no. 3 & 7, along with a Mozart trio for viola and violin, Beethoven Sonata op. 10, a Nocturne by Gloria and La Source de Blumenthal, Moscheles predicted: "*This child will achieve something great in Art,*"¹³ an accolade supported by Rossini the following year. From her first concert in Stuttgart on October 14, 1855 until 1866, the year of her marriage and her move to Paris, Jaëll performed no fewer than 185 concerts in Germany, France, England and Switzerland. Most of the concert programs contained chamber music and solo piece works, and selections ranging from the well-known masterworks to paraphrases on Operatic themes.

¹² "*Nous savons seulement que Mme Trautmann accompagnait sa fille dans tous ses déplacements, se vouant entièrement à sa carrière d'artiste qu'elle dirigea avec une rare clairvoyance. Elle l'instruisit de son mieux pour suppléer à l'absence de formation scolaire; car Marie n'est jamais allée à l'école.*" Ibid, p. 23.

¹³ "*Cette enfant fera quelque chose de grand dans le domaine de l'art.*" Excerpt from a 1856 concert report. BNUS, fonds Jaëll, MRS JAËLL, 20.

FOYER DU THÉÂTRE DE HAGUENAU.

AVEC LA PERMISSION DES AUTORITÉS.

SAMEDI 12 AVRIL 1856.
à 7 heures et demie du soir.

CONCERT
donné par la jeune pianiste
Marie Trautmann,
DE STEINSELTZ, AGÉE DE 9 ANS.

*sous le patronage de M. HANNA, professeur de musique
à Stuttgart, avec le concours de M^{lle} MINNA SIEB
première chanteuse du théâtre de la cour de Stuttgart
et de M. RIEDLÉ, premier violon de la même ville.*

PREMIÈRE PARTIE.

1. Trio en ré mineur, variations, violon et alto, de Andante,
de Minuetto et de Ronde, exécuté par Marie Trautmann,
M^{lle} Hanna et M. Riedlé. Mozart
2. Grand air de n^o 14, variations, exécuté par M^{lle} Sieb. Rossini
3. Air symphonique pour violon, exécuté par M. Riedlé. Paganini
4. Variations sur la Genevra, exécutées par Marie
Trautmann. Haydn

DEUXIÈME PARTIE.

5. Ouverture pour piano de l'opéra de Wagner par
Marie Trautmann et M. Hanna. Rossini
6. Valse, par M. Hanna.
Trio en ré mineur, par Riedlé, exécuté par M^{lle} Sieb.
7. L'arce, par Blumenthal. exécuté par
Le Feu Sacré, par Riedlé. Marie Trautmann.
8. La Symphonie, air varié pour violon, exécuté par M.
Riedlé. Liszt
9. Falsaria pour piano, exécutée par Marie Trautmann. Mendelssohn

BNU
STRASBOURG

Recital program for a concert given in Haguenau on Saturday, April 12, 1856, when Jaëll was 9.
Document BNU Strasbourg.

Much like Mozart (although on a smaller scale), Jaëll traveled internationally during her childhood and was afforded a glimpse into the aristocratic world when she played for Queen Victoria in 1857, who was charmed by this "liliputian pianist" and gave her a little jewel as a

token of her appreciation.¹⁴ Often asked to perform a second and a third concert in the cities where she toured, Jaëll's reputation grew rapidly, her performances earning enthusiastic public reception and many laudatory reviews. Critics often observed Jaëll's remarkable musical understanding, noticing for instance how *"this child plays Mozart, Beethoven, Mendelssohn, Herz's most difficult works not only with extraordinary technique and perfect interpretation, but also with a rare musical comprehension, a profound musical sentiment and the purest delicacy."*¹⁵ These critics also noticed Jaëll's humility and natural connection with the music, such as in this review written after a concert in Strasbourg: *"She is the first child prodigy I ever heard laughing. She can hardly keep a straight face while playing Mozart with her colleague, and leads it like a little general without putting herself in the limelight. Her attitude is unpretentious, graceful and natural. Applause doesn't manage to intoxicate her. Here is a talent who resists all vanity."*¹⁶

Similarly, the Bamberger Zeitung praised her composure that served the music rather than the virtuosity: *"Marie Trautmann has an accomplished technique, a control and precision which border on the miraculous, yet without a trace of the virtuosity which tends to overshadow*

¹⁴ "Au printemps 1857, Marie Trautmann partit pour l'Angleterre et joua à Londres. La reine Victoria, charmée par le jeu de cette 'pianiste liliputienne' lui fit cadeau d'un bijou." Kiener, Hélène. *Marie Jaëll, 1846-1925; Problèmes D'esthétique Et De Pédagogie Musicales*. Bibliothèque D'esthétique. Paris: Flammarion, 1952. p. 25.

¹⁵ After a Baden Baden concert in 1856: *"Cette enfant joue les oeuvres les plus difficiles de Mozart, de Beethoven, de Mendelssohn, et de Herz, non seulement avec une technique extraordinaire et une exécution parfaite mais avec une compréhension rare, un sentiment profondément musical et avec la délicatesse la plus pure."* Ibid p. 24.

¹⁶ *"Pour une enfant prodige, elle est la première que j'ai entendu rire. Elle a de la peine à garder son sérieux lorsqu'elle se retourne vers ses partenaires avec qui elle doit jouer le trio de Mozart qu'elle mène en vrai petit général, mais sans jamais se mettre en avant. Son attitude est sans prétention, gracieuse et naturelle. Les applaudissements ne parviennent pas à l'enivrer. Voici un talent résistant aux sollicitations de l'orgueil."* Ibid p. 24.

everything else. She is not looking for effects. She draws her art from the depth of her being."¹⁷

In this manner, Marie Jaëll never allowed herself to become blinded by fame and praise, and according to several recollections seemed unfazed by her critical acclaim. Kiener recalls how Jaëll always remained simple and natural, without any artifice, and avoided the obstacle of fame that often lead child prodigies astray.¹⁸

Marie Jaëll, aged about 10 years old. Picture taken at a concert in Cobourg.
Document BNU Strasbourg.



¹⁷ *"Marie Trautmann possède une technique accomplie, une sûreté et une précision qui frisent le miracle, sans trace toutefois de cette virtuosité qui cherche à éblouir. Jamais elle ne vise à l'effet. Elle puise son art au plus profond de son âme."* Ibid, pp. 25-26.

¹⁸ *"Mais, fait curieux, la petite Marie semble à peine touchée par toutes ces ovations. Son attitude reste simple et naturelle. Elle est sans artifice."* Ibid, p. 26.

Never settling for her obvious gift, Marie Jaëll worked tirelessly, continuously animated by a thirst for learning. Her unending desire for discovery, which emerged in these early years, is reflected in some of her later correspondence, such as in this letter to Kiener: *"I don't know if you noticed that I have retained an extraordinary depth of ignorance. As a child, I brought with me from Steinseltz a set idea. The fact that everyone was superior, everyone knew more than me. This impression was combined with an irresistible, dominant need to learn. I always felt like I was standing at the bottom of a deep well while the others were walking in bright sunlight. I tried to grow up, but in vain; this primary feeling would stay with me, I would never climb out of the well of my own making. I am still down there. Therefore I naturally have a high opinion of others."*¹⁹

During her formative years, Marie Jaëll benefited from her proximity to the German border and a bilingual culture. Although she frequently traveled for her concerts and took her piano lessons in Germany and in Paris, she could rely on a stable anchor point in Steinseltz where she was able to deepen her musicianship. Her piano was thus installed in a small wooden house in a chestnut grove behind her house, where she would practice in nature, interrupted only by the sound of geese. An old neighbor recalled that Jaëll would take exception to these

¹⁹ *"Je ne sais pas si tu as remarqué que j'ai conservé un fond d'ignorance extraordinaire. Toute enfant j'ai emporté de Steinseltz une idée fixe. Tout le monde m'était supérieur, tout le monde savait plus que moi. À cette impression se joignait un besoin irrésistible, dominant, d'apprendre. Je me sentais toujours au fond d'un puit tandis que les autres se promenaient au grand soleil. J'avais beau grandir; au fond cette conception fondamentale grandissait avec moi et je ne sortais jamais de mon puit. J'y suis encore. J'ai donc naturellement une haute opinion d'autrui."* Non dated letter from Marie Jaëll to Fritz Kiener. BNUS, Collection particulière.

interruptions, often opening her door in the middle of her practice to admonish the geese with uncommon fierceness.²⁰

Jaëll would regularly return to this retreat, which she viewed as a refuge, throughout her life. The fact that she named her last composition "*Harmonies d'Alsace*," and that she titled a paper she presented at a scientific conference later in Paris "*Observations addressed to the Society of Physics of a musician from Alsace*," demonstrate this deep attachment to her roots, even after she moved and established herself in Paris for her career.

²⁰ "*Les petites gardeuses d'oies aimaient à s'installer sous les fenêtres de la maisonnette, et souvent elles accompagnaient de leur chant les mélodies du piano. Une vieille femme raconte encore que la solitaire ouvrait alors la porte avec fureur et les grondait, 'en français,' précisait-elle.*" Kiener, Hélène. *Marie Jaëll, 1846-1925; Problèmes D'esthétique Et De Pédagogie Musicales*. Bibliothèque D'esthétique. Paris: Flammarion, 1952, p. 51.

3. Pianistic World

Soon, Marie Jaëll found herself working with a highly renowned teacher from the Paris Conservatoire, Henri Herz. In 1856, when Jaëll first traveled to Paris to meet with the notorious virtuoso, Herz was at first reluctant to take her as a student because of her young age. He encouraged her to come back a few years later, after more maturation. But after listening to her play, Herz instantly changed his mind and decided to teach her privately.

Five years later, when Marie Jaëll turned fifteen, she eventually studied at the Paris Conservatory, as it was a rite of passage before entering the Parisian pianistic world. But, as an exception, she was granted a minimum of four months of attendance, because the faculty considered that she was ready to take the final examination. Awarded a 'Premier Prix,' her teacher Mr. Herz even gave her a grand piano as a graduation present.

Diplôme du Conservatoire impérial de Musique. First Prize in Piano awarded to Marie-Christine Trautmann in 1862.
Document BNU Strasbourg.



Jaëll's teachers did not hide their excitement for her generational musical talent. One examiner marveled on Jaëll's final review how *"one of the youngest students made an extraordinary impression. The penultimate candidate, she had to play after 20 other contestants, but she restored freshness and life to the piece; one had the impression of never having heard the piece before, so much was it marked with her individuality. Her superior mechanism, her beautiful style, her delightfully nuanced playing of absolute purity and exquisite taste, amazed the audience all the way through. Regarding the ease and aplomb with which Mrs. Trautmann addresses all difficulties, it would never occur that she had only just finished her Conservatory studies. Many artists would love to finish their career the way she has started hers."*²¹

Jaëll's study with Henry Herz is of special interest, as her later method is the antithesis of Herz's more traditional piano teaching that emphasized the virtuosity rather than musicality, relying on hours of repetitive and stubborn practice, and obsessed with technique in a mechanical sense. Austrian by birth but French by domicile, Herz established himself as a Professor of Piano at the Paris Conservatory, where he taught a woman's class from 1842 to 1874. He was one of the first Europeans to perform in the United States, and concertized all the way to San Francisco, Mexico and the West Indies, experiences that he compiled in a book *"Mes Voyages en Amérique."*²² In addition to being one of the most sought-after virtuosos of his time, Herz was also an immensely popular teacher. Thus, it was very common for the least fortunate students to

²¹ *"Une des plus jeunes élèves a produit une impression extraordinaire. Elle n'est arrivée que l'avant-dernière après vingt autres concurrents, mais elle a rendu au morceau la fraîcheur et la vie; on croyait ne l'avoir pas encore entendu, tant elle l'a marqué au cachet de sa nature individuelle. Son mécanisme supérieur, son beau style, son jeu délicieusement nuancé, d'une pureté irréprochable, d'un goût exquis, d'une élégance soutenue, ont constamment émerveillé l'auditoire. A voir l'aisance et l'aplomb avec lesquels Mademoiselle Trautmann aborde toutes les difficultés, on ne se douterait jamais qu'elle vient de sortir du Conservatoire. Beaucoup d'artistes voudraient finir comme elle a débuté."* Commentaire du premier prix de piano au Conservatoire de Paris paru dans la *Revue et gazette musicale de Paris* du 27 juillet 1862.

²² Herz, Henri. *Mes Voyages en Amérique*. Paris: A. Faure, 1866.

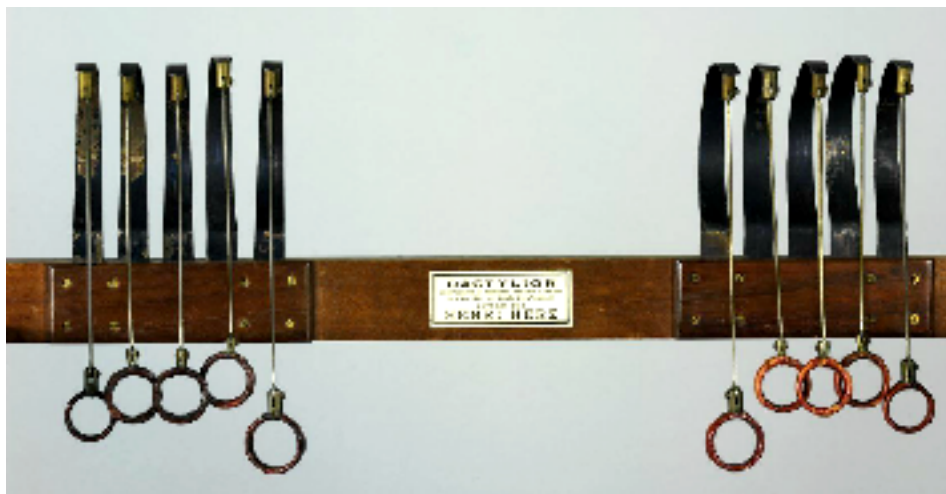
have to come at six o'clock in the morning for their piano lesson. An article for *Le Corsaire* jokingly caricatured the excessive side of this type of piano teaching: "*Mr. Henry Herz, No. 38, rue de la Victoire, is quite an eccentric professor. His lesson generally lasts half an hour — ten minutes for arranging the large curls of the cravat of Mr. Henri Herz — ten minutes more to wind his watch — his showpiece from Bréguet — out of his fob, which he hooks with ceremony on the piano — the last ten minutes for the instruction and advice which Mr. Henri Herz, No. 38, rue de la Victoire, invariably gives while arranging his curls.*"²³

Herz's compositions also reflect his showy piano style and theatrical method of teaching. Consisting mainly of piano concertos and variations on opera themes, Herz's works generated disdain among a certain number of musicians, including Schumann, who stated how he would always try to "*stay at least ten paces away*" from Herz, before relenting that "*we should not forget that he has kept millions of fingers busy.*"²⁴ There is perhaps no more perfect representation of Herz's stringent teaching method than the *Dactylion*, a torture device Herz designed to loosen and strengthen pianists' fingers in order to render them independent.

²³ Schonberg, Harold C. *The Great Pianists*. New York: Simon & Schuster, 1963, p. 180.

²⁴ "*About Herz one can write (1) sadly, (2) gaily, (3) sarcastically or, as now, all three at once. One can hardly believe how cautiously and shyly I avoid any discussion of him, and how I try to stay at least ten paces away from him, lest I praise him too loudly to his face.*" Schumann, Robert, trans. by Henry Pleasants. *Schumann on Music: A Selection from the Writings*. Dover publications: New York, 1965. pp. 110-111. On Henry Herz Piano Concerto No. 2, chapter preceding the one on Chopin's piano Concerti.

D'Almaine & Co., Catalogue of Elementary Works, school music, methods, tutors, books of instruction, first lessons, exercises easy and difficult, studies, works on the theory of music, treatises, primers, dictionaries, &c, London, D'Almaine & Co, 1840, p. 34.



Dactylion (Musée de la musique de Paris).

Consisting of two parallel wooden bars, the bottom bar could be attached under the keyboard to fix the Dactylion in place. The top bar had ten rings hanging on strings, allowing for a certain resistance while playing the piano. Springs enabled the user to either increase or

decrease the resistance. Unfortunately for students, the dactylion enjoyed considerable success in its time. This type of teaching was the very antithesis of the ideas Jaëll would elaborate on a few decades later, thanks to her research on the physiology of the hand. Where Herz aimed to torture the hand into submission, Jaëll sought to liberate it from its physiological limitations.



Henri Herz, Professor at the Paris Conservatoire.
Document BNU Strasbourg.

From 1862 until 1866, after studying with Henry Herz and a brief time at the Paris Conservatoire, Jaëll pursued her successful career, receiving laudatory appraisals. In particular, a review released after a concert in Nuremberg compared her favorably to Clara Schumann:

*"Clara Schumann's so expressive, soulful playing leads us to a sweet dream. We admire her deep comprehension of the greatest masters. . . . Marie Trautmann, on the other hand, enralls and ignites us. When she takes possession of her piano, we can feel the presence of a creative genius who knows how to inject her personal temperament into the sound matter; yet without betraying the master."*²⁵ By the age of twenty, Marie Jaëll already had both feet in the pianistic world in every way, touring European musical centers, receiving constant accolades, being the mentee of one of the most popular virtuoso figures and brilliantly passing the Paris Conservatoire test. Her meeting with Alfred Jaëll in 1866 would plunge her even more into the very heart of the international pianist life.

Born in Trieste, in the Austrian Empire, on March 5, 1832, Alfred Jaëll's reputation as a pianist was already well-known. Like his future wife, he had an early start at the piano, though his road to celebrity status, as a child prodigy, was far more conventional. Born in Trieste, Austria, into a family of musicians — his father was solo violin at the Vienna Theater-Konzert Orchestra and founded a school of music in Trieste — and the family settled down in Vienna so Alfred could work with Czerny.

Alfred Jaëll's critical acclaim arrived swiftly after only a few public performances. Nicknamed *"un diavoletta-pianista — a mephisto of the keyboard"*²⁶ after his first concert at the Scala in Milan at age 11, he met Liszt two years later who introduced him to the Court of

²⁵ *"Le jeu si expressif, si plein d'âme de Clara Schumann nous porte à une douce rêverie. Nous admirons en elle la compréhension profonde des grands maîtres. . . . Marie Trautmann, au contraire, nous entraîne et nous enflamme. Lorsqu'elle prend possession de son instrument, nous sentons la présence d'un génie créateur qui sans trahir le maître, sait pourtant insuffler son tempérament personnel à la matière sonore."* Kiener, Hélène. *Marie Jaëll, 1846-1925; Problèmes D'esthétique Et De Pédagogie Musicales*. Bibliothèque D'esthétique. Paris: Flammarion, 1952. p. 28.

²⁶ Quoted from *La Gazette musicale di Milano* by die *Allgemeine Wiener Musik-Zeitung*. Jan 6th-7th 1844; and *Neue Zeitschrift für Musik*. July 4th 1856.

Wurtemberg and became a lifetime friend and colleague. In 1846, the year of Marie Trautmann's birth, Alfred Jaëll moved to Paris, one of the most prominent centers of musical and artistic life at the time, and worked with Chopin throughout that winter. He performed in many Erard salons, and later was asked to represent the prestigious piano brand during his tours.

As a soloist with major orchestras in Europe (one who received a personal invitation to perform for Napoleon III), Alfred Jaëll's fame ultimately caused the American impresario P.T. Barnum to offer him a contract for a piano tour in the United States. Alfred Jaëll seized the opportunity and toured in the biggest American cities, performing approximately 400 concerts in four years, a harrowing travel schedule that was only exacerbated by the limited travel options of the time and likely contributed to his worsening health. Weary of his epic American tours, Alfred Jaëll returned to France in 1855 to continue his intense professional life. As he was still in heavy demand by impresarios, Alfred Jaëll was always on the road performing, and collaborated with notable figures such as Clara Schumann, violinist Henri Vieuxtemps, and singer Jenny Lind. His appointment in 1856 as pianist to the court of King of Hanover did not stop him from pursuing his tours in Europe and Russia, both as a soloist and with the soprano Carlotta Patti, all of which further propelled his fame. The prestige of this traveling virtuoso was also high among his peers, including Franz Liszt, who would amusingly acknowledge his inability to reproduce Alfred's trills later on.



Italian caricature, Alfredo Jaell, 1859.
Document BNU Strasbourg.



Italian caricature picturing Alfred Jaell
performing Schumann Carnival. Document graphique, 1870
Document BNU Strasbourg.

When Alfred Jaëll married Marie Trautmann, on August 9, 1866, she had not yet turned twenty and lived only for her music. Their union brought two different worlds together. Alfred was a city dweller, accustomed to splendor and high society; Marie, by comparison, valued the untarnished simplicity of her rural upbringing. A letter from Madame Trautmann to Marie reflects this cultural shock: *"Dear Alfred amuses me, as he asked me to have a picture taken in Steinseltz, when they are not even photographers in Wissembourg! I beg you, Marie, prepare him for the society he is going to find here: farmers, horses, cows, sheep, hens, ducks and geese."*²⁷

Although this union exposed Marie Jaëll to a new cosmopolitan musical world, she was already an accomplished and highly praised pianist completely devoted to her art. Still, Alfred's experience and travels connected him to the greatest masters of the time, such as Brahms, Rubinstein, and Liszt, who would always maintain a very close bond with the Jaëlls. After their wedding and visits to their respective families, Marie and Alfred spent the next years traveling throughout Europe, performing at the most prestigious concert venues, such as the Gewandhaus in Leipzig. And when they were not traversing the continent, they would receive guests in their living room in the Rue Saint-Lazare in Paris. Unfortunately, this hectic and lively musical life would nevertheless encounter some unexpected detours in the coming decade.

²⁷ *"Ce cher Alfred me fait rire, en me demandant de me faire photographier à Steinseltz, alors qu'il n'y a même pas de photographe à Wissembourg! Je t'en supplie, Marie, prépare-le à la société qu'il va trouver ici: des paysans, des chevaux, des vaches, des moutons, des poules, des canards et des oies."* Lettres de Madame Trautmann à sa fille, Nov 1866, BNUS fond Jaëll, MRS Jaëll, 322, 282.



Document graphique, 1866. J.E. Schubert photograph.
Fond BNU Strasbourg.



Document graphique, 1999. Photograph
reproduction of an original Picture dated from
January 4th 1867. Gausse Geneviève, photograph
Fond BNU Strasbourg.

4. Tragic Turns of Events and Continuation

On July 19, 1870, the Franco-Prussian War began after a period of conflict and tensions regarding Prussian ambitions of European expansion. Because of its geographic location, Alsace-Lorraine was a particularly important strategic site. One of the first battles of the war took place near Wissembourg, only a few miles away from Jaëll's hometown, Steinseltz.

The Jaëlls' life was deeply impacted by this conflict. Only a few days before the war started, Marie and Alfred Jaëll spent another musical night in Leipzig with Liszt, performing duets, and could not predict that their liberty to come and go as they wanted to Germany would end shortly. Indeed, the announcement of the war pushed the couple to move to Switzerland until war's end in May 1871. This provided the occasion for them to meet Richard and Cosima Wagner, but Marie Jaëll and Richard Wagner had very little affinity for each other because of their divergent patriotic attitudes and political alliances.

These trying months were very traumatic for Marie Jaëll, who remained emotionally attached to Alsace, and had professional consequences. Alfred Jaëll had been offered the direction of the Leipzig Conservatory, succeeding Moscheles, as well as the direction of the *Neue Zeitschrift für Music*, the famous music journal founded by Schumann. Marie had told him that she wouldn't mind going "to their [*The Germans*'] home" if France emerged victorious, but would leave in case of defeat.²⁸ Surprisingly, as an Austrian, Alfred Jaëll refused both positions;

²⁸ "Si nous sommes victorieux, cela ne me fait rien de vivre 'chez eux,' mais en cas d'échec, je pars." Kiener, Hélène. *Marie Jaëll, 1846-1925; Problèmes D'esthétique Et De Pédagogie Musicales*. Bibliothèque D'esthétique. Paris: Flammarion, 1952. p. 43.

consequently, the couple would not give any more concerts in Germany after the War, and settled for good in Paris.

As with every Alsatian, Marie Jaëll had to choose between German and French nationality; Jaëll opted for French without pause. France's defeat deeply affected her and her family, and was reflected in their correspondence with mixed feelings of irony and grief. For instance, Mr. Trautmann, who decided to write exclusively in French after 1871, wrote with rebellious exuberance how a fundraiser organized in the Alsatian villages to pay for the erection of a monument to the glory of Kronprinz of Prussia in Steinseltz, had collected only "*2 marks and three pfennigs!*"²⁹ — a little less than 2 dollars. For her part, Marie Jaëll lamented how "*Alsace has never seemed as sad to me, and the Germans have never seemed more victorious. It seems like they are reliving Froeschwiller and Sedan every day, and every one of them had defeated all of France.*"³⁰

Encouraged by the defeat against the Germans, nationalist feelings increased in France and in the artistic world as well. In 1871, Camille Saint-Saëns created the Société Nationale de Musique, Ars Gallica, as a way to promote and defend the quality of French music, particularly in contrast to the Germanic tradition. Personified by figures such as Chausson, Duparc, Fauré, Gounod, d'Indy, this group also had the ambition to bring to the fore young emerging composers.

It is in this time period that Marie Jaëll pursued compositional aspirations, to even greater acclaim. Marie Jaëll took composition lessons with Camille Saint-Saëns during the 1870 decade,

²⁹ "*À Steinseltz, cette collecte a rapporté deux marks et trois pfennigs!*" Undated letter from Georges Trautmann to his daughter, BNUS, collection particulière.

³⁰ "*L'Alsace ne m'a jamais paru plus triste, et les Allemands n'ont jamais eu des airs plus victorieux. On dirait qu'ils revivent Froeschwiller et Sedan chaque jour, et que chacun en particulier a vaincu toute la France.*" Kiener, Hélène. *Marie Jaëll, 1846-1925; Problèmes D'esthétique Et De Pédagogie Musicales*. Bibliothèque D'esthétique. Paris: Flammarion, 1952. p. 46.

and composed a number of works for diverse musical combinations. For many virtuoso pianists from the nineteenth-century, including Herz and to a lesser degree Alfred Jaëll, composition would take the form of brilliant paraphrases or variations on Operatic themes or technically challenging transcriptions. On the other hand, even though piano was her preferred instrument for composition, Marie Jaëll had a more extensive and lively approach to composition. For example, Saint Saëns compared her first works to the *"eruption of a devastating torrent."*³¹ Along with two concerti for piano, Marie Jaëll also composed an unfinished opera, Runéa, lieder and many chamber music works. Jaëll's works were well-received and widely praised, as exemplified by this review from the Musical Gazette of Paris: *"Filling the Érard Hall, has become the privilege of truly great concerts; it was so with that of Mr. and Mrs. Jaëll...But a greater part of the interest of this concert was attached to Mme Marie Jaëll's second début as a composer. Everyone remembers her first concert, last year, with a piano quartet; this time Mme Marie Jaëll presented the public with waltzes for four hands. It is highly remarkable, and far superior to what could normally be expected from a woman. . . ."*³²

It was no easy task to gain popularity as a female composer, particularly in the male-dominated Parisian music scene. But Marie Jaëll's unerring devotion to the larger world of music, undeniable musical talent, and tireless work ethic generated respect from her peers. As a

³¹ "Camille Saint-Saëns compared his pupil's first attempt to the irruption of a devastating torrent." Guichard, Catherine, trans De Souza Cyrille. *Marie Jaëll, The Magic Touch, Piano Music by Mind Training*. New York: Algora, 2004. p. 57.

"He [Camille Saint-Saëns] would say of her, 'Marie first attempts have been tumultuous and excessive. They looked like the eruption of a devastating torrent. But, since then, calm has fallen on her gentle nature; every day she perfects herself in her art; she does not lose sight of her objective for a second; she will succeed.'" Ibid, p. 7.

³² Ibid, p. 58.

result, Marie Jaëll became the very first woman to enter the Société Nationale de Musique in 1887, sponsored by Saint-Saëns and Fauré.

Despite these professional successes, Jaëll still struggled with the sociopolitical landscape, and eventually a far more personal conflict. As her career became increasingly more eclectic and intense, she questioned her place as a woman, wife and creator. Jaëll's commitment to creation is reflected in a letter to her friend Anna Sandherr from 1878, where she writes:

*"Learning how to compose is a passion that never leaves me. I wake up every morning and fall asleep every night with it. I have such high standards about my art that what brings me joy is to devote my life to it without hoping for anything else than living through it and for it."*³³ At the same time, she was debating whether a creative woman could also be a wife, as reflected in the following excerpts from an epistolary exchange with her literary friend Schuré: *"From a woman, gifted or not, man takes away everything, little by little, and robs her of her creative forces; he takes away her life. How often I have seen my dreams shattered by this single fact. The union of two beings can certainly be beautiful, splendid, marvelous, but... Must a woman always give in, and make the choice between the wings of the body and the wings of the soul, sacrifice the former for the latter. Can't she keep all four? It is a mystery, and I wanted to see how it ends.*

*Was the dream too reckless?"*³⁴

³³ *"Apprendre à composer, passion qui ne me quitte jamais, Je me réveille le matin avec elle, je m'endors avec elle le soir. J'ai une idée si haute de mon art que toute ma joie est de lui vouer ma vie sans espérer autre chose que de vivre par lui et pour lui."* Lettre de Marie Jaëll à Anna Sandherr, November 27th 1878.

³⁴ *"À la femme, qu'elle soit douée ou non, l'homme prend à peu près toutes les choses dont il tire ses forces pour produire. Il lui prend la vie. Combien de fois me suis-je vu sombrer avec tous mes rêves dans ce seul fait. L'union de deux êtres peut, certes, être belle, splendide, merveilleuse; mais...la femme doit-elle toujours succomber et faire le choix entre les ailes du corps et celles de l'âme, sacrifier les unes aux autres? Ne peut-elle garder quatre ailes? C'est un mystère dont j'ai voulu voir la fin; le rêve était-il trop téméraire ?"* Lettre de Marie Jaëll à Edouard Schuré, septembre 1878.

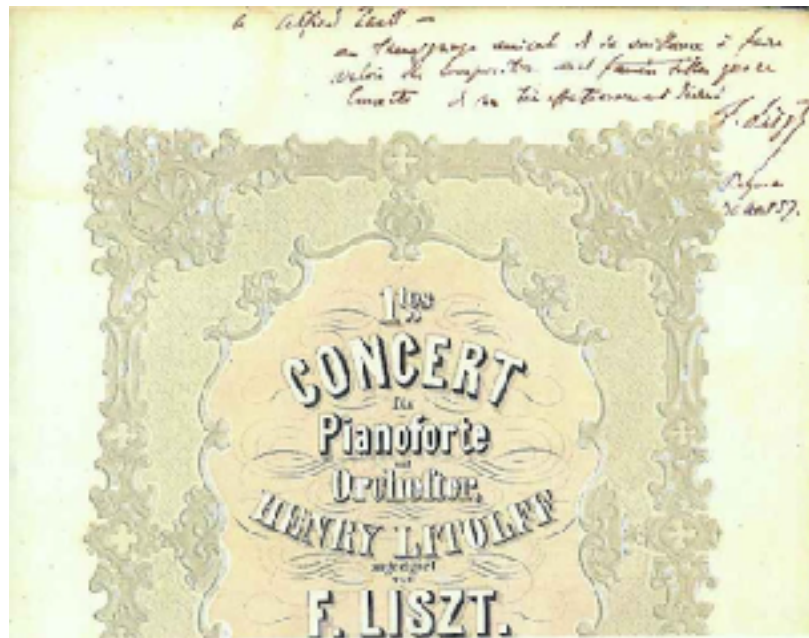
Marie Jaëll likely never had a chance to resolve this conflict, as her existential introspection was interrupted by an unexpected period of grief. After losing her mother in 1878, who had been such an important support from the very start of her artistic career, Alfred Jaëll's diabetes worsened suddenly, to the point that he was forced to end concerts prematurely. After four years of continuously declining health, Alfred Jaëll died in 1882, leaving Marie a widow at thirty-five. Despite her independent personality, Marie Jaëll was deeply affected by this loss, a sorrow poetically reflected in her words to her childhood friend Anna Sandherr: *"Such like a star, the soul has a path. I can't see it but I know it. I just have to look back. Since there was something behind me, there will be something ahead of me."*³⁵ To herself, she would write: *"I must admit it is really dark, and without illusions, one must plunge into darkness and gaze into nothingness."*³⁶ This tonal shift is significant, as Marie Jaëll was always quite private and restrained in her prior correspondence. While she talked openly about music, discoveries, nature, philosophical matters, she very rarely made allusions to her personal life, and kept an aura of mystery in most of her letters. But following Alfred's death and during World War I, her writing would become more personal and darker.

In spite of her profound grief, Marie Jaëll worked frantically, with the support of loyal friends, a circle of students, and some influential figures of the time such as André Siegfried, Edouard Schuré, André Gide, scientists, and above all Saint-Saëns and Liszt. Liszt, who had been a lifelong friend and colleague of the Jaëlls, immediately expressed his support for Marie

³⁵ *"L'âme comme l'étoile a une route, je n'en vois rien, mais je le sais. Je n'ai qu'à regarder en arrière. Puisqu'il y a eu quelque chose derrière moi, il y aura quelque chose devant moi."* Letter to Anna Sandherr, 1882.

³⁶ *"Il faut convenir qu'il fait bien nuit et que sans se faire illusion, il faut plonger dans le noir et regarder le néant."* Quoted by Marie Jaëll diary by Kiener, Hélène. *Marie Jaëll, 1846-1925; Problèmes D'esthétique Et De Pédagogie Musicales*. Bibliothèque D'esthétique. Paris: Flammarion, 1952, p. 49.

after her husband's death, sending this comforting note: *"Dear Admirable one, Life and death, the same mystery! Let us raise our hearts through faith and hope; that they might purify, sustain, console, idealize our love and make it worthy of its heavenly origin and end. Yours cordially devoted, F. Liszt."*³⁷ Indeed, the admiration and respect between the Jaëlls and Liszt was always mutual. As Alfred and Marie had largely contributed to the dissemination of his music during their lifetime, Liszt had always held the couple in high esteem. An instance of this is seen on the title page of Liszt's First piano concerto, given as a gift to Alfred: *"To Alfred Jaëll, in friendly to his bravery in putting forward ill-reputed compositions such as this concerto, from his affectionately devoted, F. Liszt."*³⁸



Original autograph from Liszt to Alfred Jaëll.
Document BNU Strasbourg.

³⁷ *"Chère Admirable, La vie et la mort, même mystère! Elevons nos coeurs par la Foi et l'Espérance: qu'elles épurent, soutiennent, consolent, idéalisent notre amour et le rendent digne de sa céleste origine et fin... Votre cordialement dévoué, F. Liszt."* Ibid, p. 49.

³⁸ *"À Alfred Jaëll, en témoignage amical de sa vaillance à faire valoir des compositions aussi mal garées telles que ce Concerto, de son très affectueusement dévoué, F. Liszt."* BNUS, Fonds Jaëll: 56, 2.

Liszt also asked Marie Jaëll to finish his third Mephisto Waltz and would willingly facilitate her accommodations as she traveled for her performances, such as in Budapest in 1883: *"Dear Admirable one, without delay, I give you the most cordial welcome to Budapest. Have you yet been able to arrange for concerts here? Is my very great friend, Bösendorfer, acting as an intermediary? I regret that I'm not in the position to assist you in this matter because of my pronounced squabble with the main concert 'arrangers' of the town, who are impertinently practicing a lucrative market to the detriment of art. . . . Please keep me posted with your new compositions, please accept the assurance of my highest admiration, sympathy and affection."*³⁹

Jaëll's admiration for Liszt was strong enough to push her to overcome even her aversion to all matters German. In 1883, for the first time since the 1871 defeat, Jaëll traveled to Weimar to visit Liszt. She responded to his invitation, despite her friend's warning that Liszt *"would dry up the real sap of your individuality, and he would be tempted to graft a shoot of his own onto the sturdy stem of your thoughts."*⁴⁰ Having postponed their professional partnership because of politics, Jaëll decided to have several stays in Weimar from 1883 where she collaborated with Liszt, took an active part in his musical life, assisted Liszt during his lessons, and enjoyed many intellectual and artistic exchanges during the final years of Liszt's life. In addition to taking part in public concerts, she mostly devoted her days to practicing and researching, trying to stay away

³⁹ *"Chère Admirable, je vous dis de suite la plus cordiale bienvenue à Budapest. Avez-vous déjà pris vos arrangements de concerts ici? Mon excellentissime ami Bösendorfer vous sert-il d'intermédiaire? À mon regret, je ne suis pas en mesure de vous assister en cela, vu ma bisbille très prononcée avec les principaux arrangeurs de concerts de la localité, qui font impertinemment un juteux métier au profit de l'art. . . . Veuillez me faire connaître vos nouvelles compositions et agréer l'hommage de mon admirative sympathie et affection."* BNUS, fonds Jaëll, MRS JAËLL 322, 165, 68. Letter dated from 12/02/1883.

⁴⁰ *"N'allez pas auprès de Liszt, lui disait son ami, le général Parmentier: il tarirait la vraie sève de votre individualité et il serait tenté de greffer sur la tige vigoureuse de votre pensée un rejeton de la sienne."* Kiener, Hélène. *Marie Jaëll, 1846-1925; Problèmes D'esthétique Et De Pédagogie Musicales*. Bibliothèque D'esthétique. Paris: Flammarion, 1952. p. 55.

from the intrigues that surrounded Liszt. She was particularly interested in the way Liszt was mentally practicing, hearing internally what his fingers would silently play on the table.

Liszt's death in 1886 marked a turning point in Jaëll's life and motivated her to replace the instinctive approach to music with a conscious one, focusing on mental representations and knowledge of the mechanism that allowed for an artistic performance. In order to embark on this new path, combining influences from art and science, Marie Jaëll realized the importance of studying the physiological laws that regulate hands' motions. For the rest of her life, she would devote herself entirely to teaching and researching, driven by the urge to serve her art in the most meaningful way possible.

Entering the last decade of the Nineteenth Century, Jaëll had already forged an immense and impressive artistic career as a virtuoso, composer and pedagogue. She was at the apogee of success when she took a radical turn in her musical approach: between 1892 and 1894, she still performed all thirty-two Beethoven sonatas, and the complete works of Schumann and Liszt. But until her death, she quit concert performing and set composition aside in order to commit herself entirely to physiological research, and to devote herself to understanding piano mastery through scientific methods and analysis.



BNUS, Fonds Marie Jaëll. Graphic document, 1887.

C. THE SCIENTIFIC RETREAT

1. Causes

a. Memory of Liszt's Three-dimensional Playing

Even after his death, Liszt continued to play an important part in Jaëll's research. In *Les Rythmes du regard et la Dissociation des doigts* ("Rhythms of the Gaze and the Dissociation of the Fingers"),⁴¹ published in 1906, Jaëll recalled how she was always haunted by the first time she heard Liszt's extraordinary playing at a concert in Rome in 1868. Fifty years later, she still remembered how his musical execution seemed to transform her powers of hearing. Jaëll recalled that Liszt's performance awoke all of her senses, especially her vision. Through his playing, she was able to perceive an architecture in the sounds, a phenomenon that she would later attribute to Liszt's extraordinary three-dimensional playing, and distinct state of awareness for every one of his fingers.

When Jaëll had the chance to visit Liszt for extended stays in the final years of his life, she was particularly interested in his way of mentally composing music. She describes in *La Musique et la Psychophysiologie* ("Music and Psychophysiology")⁴² how Liszt would use his hand to measure and feel with his fingers the intervals he wanted to write down on the paper. Before even playing a note, Liszt formed in his mind a method of attack, making a mental effort to hear the intervals without the help from the piano. Only after externalizing his internal musical

⁴¹ Jaëll, Marie. *Les Rythmes du regard et la Dissociation des doigts*. Paris: Alcan, 1906.

⁴² Jaëll, Marie. *La Musique et la Psychophysiologie*. Paris: Alcan, 1896.

representations did Liszt approve or not of the musical combinations that resulted.⁴³ Although not the only factor of Jaëll's physiological turn, there is no doubt that Liszt's influence contributed in great part to Jaëll's conception of a superior state of consciousness in music that engaged all of the senses.

b. Second Romantic Generation

While the founders of Romanticism considered music as both a sentiment and a science of its own, leaving it to the poetic imagination to resolve the matter, the later Nineteenth-Century saw the emergence of a Romanticism that felt the need to stay stable in its essence in the face of many different and significant aesthetic shifts. Although it retained the revolutionary themes of its predecessor, this new movement had the advantage of anchoring itself to the roots of tradition while having more distance from its ideals. Manifesting itself by an insatiable quest for knowledge, intellectual passion, analytical attitude, and a renewal in forms of expression, this new Romanticism was able to explore new realms of possibilities thanks to a rebellion against the vague and flattering notions of intuition and emotion. This generation thus started to employ methods of modern science to explore and improve human perceptions.

This time period favored research, due to the development of new means of communication, the industrial revolution, and the emergence of a bourgeois class that was highly cultivated and curious, open to progress, and disdainful of the perceived need to adhere to

⁴³ *"Il posait parfois la main sur la table dans le but d'établir réellement avec les doigts les intervalles des notes qu'il voulait écrire, comme s'il se les représentait ainsi sous forme de mouvements d'attaque. Pendant qu'il maintenait les mêmes intervalles, il semblait faire un effort d'attention pour les mieux entendre, et paraissait ensuite approuver ou ne pas approuver les combinaisons musicales ainsi scrutées."* Jaëll, Marie. *La Musique et la Psychophysiologie*. Paris: Alcan, 1896. p. 127.

preconceived ideas. Thanks to this optimistic, yet realistic, attitude, medical technology advanced considerably, psychoanalysis was founded and physiology became a recognized science. Among others, Claude Bernard published an *Introduction to the Study of Experimental Medicine* in 1865,⁴⁴ and in 1894 Binet wrote *Introduction to Experimental Psychology*.⁴⁵ Meanwhile, the field of neurology made significant progress in mapping the zones of the brain and studying reflexes. In parallel, music began to renew itself through innovations in timbres, harmonies and sonic realms. At the same time, music also became more self-conscious with the emergence of sound recording, as its ephemeral quality allowed for many interpretative variations.

Living in Paris during this time period certainly stimulated Jaëll's spirit in many different ways. In her personal library, Jaëll aimed to free herself from the preconceived notions and intellectual trappings of educational specialization by immersing herself in the works of Claude Bernard, Charles Darwin, Herbert Spencer, Alfred Binet, Platon, Aristote, Montesquieu and Schopenhauer. Not content to simply gloss over complex topics and mindlessly regurgitate jargon to show her knowledge of the superficial, she continued to challenge herself by attending reputed math classes at the Sorbonne. It was indeed Jaëll's nature to deepen every subject until she understood its sense, a personality trait that was deeply enhanced by the time period she was living in.

⁴⁴ Bernard, C. *An introduction to the study of experimental medicine*. New York: Dover Publications. 1957.

⁴⁵ Binet, A. *Introduction à la psychologie expérimentale*. Paris: F. Alcan. 1894.

c. Piano as a Medium

Advancements in the design of the piano as an instrument, as well as the basic nature of the piano as an instrument, further propelled Jaëll's intellectual quest for musical understanding. Indeed, the development and technical improvements in keyboard construction required an increasingly precise understanding of the instrument by the performer in order to unlock the instrument's true potential. The piano had a universal quality in the sense that it was the most complete tool to work with for composers, conductors, and teachers. Piano ownership had a social quality as well, as owning a piano was, for every bourgeois household, a cultural symbol and a way to become acquainted with music from the past and present. Even with the emergence of sound recording, the piano flourished in part because, as Julie Kurzell notes: *"The imperfections of early sound recording sharpened the listener's awareness of the piano's many advantages."*⁴⁶

Accordingly, different schools of piano playing developed as a means of combining the piano's new, complex possibilities with its traditional individual quality. At the same time, a sociocultural gap emerged between the predilection for dazzling virtuosity and research of musical expressivity. This is partly attributable to pianists' general ignorance of the piano's actual physical mechanics, which seemed so mysteriously infallible and somehow so perfect that pianists developed the obsession with being technically faultless in order to master the instrument.

⁴⁶ Kurzell, Julia. "Visualizing Piano Playing, 1890-1930." Grey Room, no. 43 (2011): 66-87. p. 68.

In the foreword of her new method of the touch, Jaëll quoted a fragment of a letter by Liszt, an ode regarding the possibilities of the piano: *"The piano holds, in my view, the highest rank in the hierarchy of instruments; it is the most widely cultivated, the most popular of all; it owes this significance and this popularity partly to its power of harmony, which the piano alone possesses, and, due to its power, to its capacity to sum up the entire art of music. Within the space of seven octaves, it embraces the range of an orchestra, and the ten fingers of a single man are sufficient to render the harmonies produced by an assembly of a hundred musicians. By its mediation, works that remain unknown or little known to the public, due to the impossibility of gathering an orchestra at any given place and time, become known. It [the piano] multiplies it, and transmits it to everyone, and if it does not convey its colors, it conveys at least its lights and shadows."*⁴⁷

But Jaëll warned that Liszt's high mission and standards for the piano were being compromised by an erroneous trend in music teaching: the fact that students were being taught without gaining an understanding of the music they played. Jaëll endeavored to counter this trend by emphasizing the need for application of teaching methods focusing on the sound. As Jaëll elaborated in her aptly-titled *Method of the Touch*, it was the first time methods of touch were being used in the piano context since CPE Bach's *Versuch* and François Couperin's *L'Art de Toucher le Clavecin*. In particular, Chopin's attention to fingerings aimed in the same direction;

⁴⁷ *"Le piano tient, à mes yeux, le premier rang dans la hiérarchie des instruments; il est le plus généralement cultivé, le plus populaire de tous; cette importance et cette popularité, il les doit en partie à la puissance harmonique qu'il possède exclusivement; et, par suite de cette puissance, à la faculté de résumer et de concentrer en lui l'art tout entier. Dans l'espace de sept octaves, il embrasse l'étendue d'un orchestre, et les dix doigts d'un seul homme suffisent à rendre les harmonies produites par le concours de plus de cent concertants. C'est par son intermédiaire que se répandent des oeuvres que la difficulté de rassembler un orchestre laisserait ignorées ou peu connues du grand public. Il la multiplie, la transmet à tous, et s'il n'en rend pas le coloris, il en rend au moins les clairs et les ombres."* Jaëll, Marie. *Le Toucher. Enseignement du piano basé sur la physiologie*, 3 volumes, Leipzig - Paris: Breitkopf-Härtel-Costallat, 1894, Avant propos.

specifically, on drawing the most beautiful sonority from the instrument and harmonizing the hand with the piano's sonic world.

Jaëll saw the piano as a medium between our tactile sensibility, intellectual faculty, and musical language: *"Who can deny the decisive influence exercised by some instruments, destined to compensate for our senses' insufficiency, of our general knowledge? — Thanks to the relatively considerable dimensions that the keyboard ensures regarding the scope of tactile explorations, the piano will be placed, perhaps in the not too distant-future, at the same level as these instruments — because it leads to the understanding of the unknown means by which the laws of manual sensitivity connect to the laws of musical polyphony. By studying the conductibility of the movements it favors, it contributes not only to the development of musical skills, but to the blossoming of intellectual faculties. Besides, by making us discover the marvelous polyphony of manual sensations, it also makes us realize how much the ear's functions can multiply and become more complex in the mental activity deployed by the musician."*⁴⁸

Thus, it is fundamental that the piano must avoid becoming a victim of its own developed mechanism through an obsession with virtuosity at the expense of musicality. In the foreword of *Le Toucher*,⁴⁹ Jaëll cautions pianists against losing musical comprehension in a zealous focus on

⁴⁸ *"Qui peut nier l'influence décisive que l'intervention de certains instruments destinés à suppléer à l'insuffisance de nos sens a exercée sur nos connaissances générales? — Grâce aux dimensions relativement considérables que son clavier assure au champ des explorations tactiles, le piano sera mis, à un moment qui n'est peut-être pas très lointain, au même rang que ces instruments — car il conduit à la connaissance des causes ignorées par lesquelles les lois de la sensibilité manuelle se relient aux lois de la polyphonie musicale. Par l'apprentissage de la conduction des mouvements qu'il favorise, il contribue, non seulement au développement des facultés musicales, mais à l'épanouissement des facultés intellectuelles. Du reste, en nous faisant découvrir la merveilleuse polyphonie des sensations manuelles, il nous fait reconnaître aussi combien dans l'activité mentale déployée par le musicien, les fonctions de l'oreille se multiplient et se compliquent."* Ibid, p. XII-XIII.

⁴⁹ Jaëll, Marie. *Le Toucher, Nouveaux principes élémentaires pour l'Enseignement du Piano*. Paris: Heugel & Cie Editeurs, 1894.

speedy and fastidious playing, specifically noting how Beethoven already had predicted that increasing virtuosity would ban all truth and sensibility, and said of pianists: "*Their fingers' velocity let their intelligence and sensitivity flee.*"⁵⁰

Although this prophecy is still applicable for many modern pianists who spend lengthy hours trying to perfect their mechanism for the demands of the musical world rather than to the music itself, it is nevertheless something that may be partly remedied by a more comprehensive understanding of the hand's physiology and methods of touch.

d. "How can I make sure that beauty does not flee like a dream?"

Jaëll believed that drawing a beautiful sound was not something that could be achieved by accident, and she was obsessed with determining what factors caused her to sometimes lose the quality of her sound in her performances. In one journal entry, Jaëll wrote: "*I have to play this evening. Will I have my soul at my fingertips? I want to reach the depths of souls. . . . I did not play well... beauty vanished like a dream.*"⁵¹

As we will see in a few pages in *Musique et Psychophysiologie*, Jaëll was fiercely determined, as a musician, to go beyond the instinctive stage. She believed that musicians should

⁵⁰ "Beethoven déjà avait relevé l'anomalie existant entre l'agilité du mécanisme et la compréhension musicale de l'exécutant. Il disait non seulement des pianistes: 'la vélocité de leurs doigts met en fuite leur intelligence et leur sensibilité.' Mais il allait jusqu'à prédire que l'accroissement de la virtuosité 'finirait par bannir toute vérité et toute sensibilité de la musique?'" Jaëll, Marie. *Le Toucher, Nouveaux principes élémentaires pour l'Enseignement du Piano*. Paris: Heugel & Cie Editeurs, 1894. Avant Propos 1, quoting Marx from *Anleitung zum Vortrag Beethovenscher Klavierwerke*.

⁵¹ "Je dois jouer ce soir. Aurai-je mon âme dans mes doigts? Je veux aller au fond des âmes. . . . J'ai mal joué ce soir. . . . La beauté s'est évanouie comme un songe." Jaëll, Marie. Journal excerpts (unpublished). Quoted from Guichard, Catherine, trans De Souza Cyrille. *Marie Jaëll, The Magic Touch, Piano Music by Mind Training*. New York: Algora, 2004. p. 123.

not be satisfied by attributing performance lapses to fated events determined by unknowable forces. She firmly believed that having a beautiful timbre was not an innate gift, or a musical miracle that would happen on some concert nights thanks to luck; rather, it required a conscious effort that would establish itself between the piano mechanism and the sensibility of the artist through a consistent flow of actions and reactions engendered by tactile and auditive sensations. Dissatisfied by what seemed to be a general cultural disinterest in understanding what physical factors produced good performances, Jaëll saw the necessity to provide a physiological understanding of piano playing. She believed that music should not be at the mercy of the goodwill of inspiration that emerges from the unconscious, as if by chance, with musicians acting a mere passive receptacles. Because, in Jaëll's view, the unconscious was not perfectible, unlike the human body.

2. First Elaboration of the Method of the Touch

In 1894, Jaëll started to compile her initial insights in a first version of *Le Toucher, Nouveaux principes élémentaires pour l'Enseignement du Piano* ("Touch, new basic principles for piano teaching").⁵² A revision, enhanced by her initial discoveries of fingerprints, was published in 1899. But even in 1894, the uniqueness and originality of Jaëll's mindset was evident. Jaëll states that studying piano through the pedagogy of touch does not reserve itself to pianists who are talented or those who are not; rather, it is directed towards "*those who are capable of an internal effort of will.*"⁵³ Music is, in this manner, born through the will of those who make it, which is a very democratic approach, especially coming from an artist who was a gifted child.

Drawing on her experience of the European pianistic world, Jaëll lamented a relatively unnoticed epidemic of little inadequacies in the methods of musical learning. She emphasized how major mistakes and poor understanding of the hand's physiology resulted in the development of increasingly complicated technical exercises. These mechanical exercises were, according to Jaëll, a pure waste of time, since they emphasized the fingers' anatomical clumsiness by "*trying to develop a good ensemble out of ten fingers who are working badly.*"⁵⁴ Jaëll taught that rather than giving the impression of sequentially following each other like

⁵² Jaëll, Marie. *Le Toucher, Nouveaux principes élémentaires pour l'Enseignement du Piano*. Paris: Heugel & Cie Editeurs, 1894.

⁵³ "*L'étude du Piano par l'application du Toucher ne s'adresse spécialement ni à ceux qui sont doués ni à ceux qui ne le sont pas; elle s'adresse à ceux qui sont capables d'un effort de volonté.*" Jaëll, Marie. *Le Toucher, Nouveaux principes élémentaires pour l'Enseignement du Piano*. Paris: Heugel & Cie Editeurs, 1894. Introduction I.

⁵⁴ "*Une énorme perte de temps résulte naturellement du fait que l'on cherche à acquérir un bon ensemble avec 10 doigts qui fonctionnent mal.*" Ibid, Introduction I.

alphabet letters, notes should form coherent groups. Her intent was to inject a new dynamic to piano teaching by developing a method of the touch that takes into consideration (i) laws regulating musical art; (ii) qualities and imperfections of the piano; and (iii) the physical advantages and disadvantages of the hand.

A rational study of the touch allows the fingers to loosen while consciously *"communicating to them a musical intuition to avoid mistakes that are, from the beginning, an insurmountable obstacle to the student's musical initiation."*⁵⁵ Additionally, it is necessary to react against the natural malfunction of the hand by developing a harmony between the sounds through touch. By their natural disposition, fingers are in contradiction with the laws of musical accentuation. Dynamics are one of the artificial means used to remedy this problem at the piano. But, hopefully, a physiological exploration of the making of the touch will counter the mental disconnect between the musical comprehension and fingers' velocity, and let music consciously and naturally form in our brains.

This idealistic perspective became increasingly refined as Jaëll's research progressed. In her initial method, Jaëll presented basic principles regarding the hand, the fingers and the touch, and elaborated a progression of exercises, destined to work on sound. Jaëll's exercises are, to the casual observer, strikingly simple. Typically, technical exercises present an ever-increasing succession of fast notes, and one can feel a physical resistance when practicing them. Because of this, these exercises encourage the development of poor physiological habits and produce weak hands. By comparison, Jaëll's exercises focus on the touch emission and are much more

⁵⁵ *"Tout enseignement du piano doit être commencé par une étude rationnelle du toucher, dans laquelle les notes, loin de se suivre comme les lettres d'un alphabet, formeront des groupes, on pourrait dire des mots. Cette étude assouplira les doigts, en leur communiquant une sorte d'intuition musicale et évitera des erreurs qui sont, dès le début, un obstacle insurmontable à l'initiation musicale de l'élève."* Ibid, p. 11.

challenging and less flattering pianistically as they require more mental effort, and a different kind of patience to achieve harmony between touch and sound.

Jaëll's exercises must be done at a piano dynamic in order to produce the sound with the fingers rather than the wrist or arm. This approach seeks to mostly develop the touch sensitivity, starting with the thumb alone, before combining it with other fingers. Once the weakest fingers are able to produce stronger attacks, without losing the quality of their touch, the sonority can graduate from *pp* to *F*.

In *Le Toucher*, Jaëll also approaches work on double emission, scales, successive emissions of thirds intervals and chords, arpeggiated chords and octaves. After developing the touch in a focal way through single notes, intervals and scales, Jaëll compiles works by Bach, Schumann, Mendelssohn, Schubert, Liszt, as reference pieces which provide context for the application of the touch. She asserts how *"an education in the sense of touch would lose its real significance if it were applied to the study of works without musical value."*⁵⁶ Jaëll's compilation includes the following pieces:

- Prelude in C, BWV 846, J.S. Bach
- Petit Morceau, op. 68 No. 5, Robert Schumann
- Marche Militaire, op. 68 No. 2, Robert Schumann
- Prelude in c minor, BWV 999, J.S. Bach
- Le Saint Nicolas, Robert Schumann
- Fantaisie Danse, op. 124 No. 5 Robert Schumann

⁵⁶ *"L'enseignement du toucher perdrait sa véritable portée s'il était appliqué à l'étude d'oeuvres sans valeur musicale."* Jaëll, Marie. *Le Toucher, Nouveaux principes élémentaires pour l'Enseignement du Piano*. Paris: Heugel & Cie Editeurs, 1894. Vol. II, p. III.

- Prelude in c minor, BWV 847, J.S. Bach
- Le Gai Laboureur, Robert Schumann
- Prelude in d minor, BWV 851, J.S. Bach
- Les Elfes, Robert Schumann
- Prelude in b minor, Frédéric Chopin
- Prelude in D major, BWV 850, J.S. Bach
- Prelude in e minor, Frédéric Chopin
- Romance sans paroles, op. 19 No. 6, Félix Mendelssohn
- Gigue, Partita I in B flat major, J.S. Bach
- Moments Musicaux, op. 94 no 3 in F minor, Franz Schubert
- Prelude in B major, Frédéric Chopin
- Impromptu in A flat, op. 90 no. 4, Franz Schubert
- Prelude in B flat major, BWV 866, J.S. Bach
- Prelude in c minor, Frédéric Chopin
- Arabesque in G major, Robert Schumann
- Prelude in G major, BWV 860, J.S. Bach
- Romance in F# major, Robert Schumann
- Prelude in F major, BWV 856, J.S. Bach
- Romance in d minor, Schumann
- Etude S. 136 No. 6 Liszt

The guidance Jaëll gives at the beginning of these pieces is still imbued by tradition. She justifies their inclusion by the instructions Beethoven may have given as he entrusted the musical

education of his nephew to Czerny; specifically, to play all notes in measures and to not give any indication about interpretation to the student until all notes and fingerings have been mastered:

"I beg you to teach him how to play every note in measure, and only when he no longer makes mistakes and possesses the correct dexterity should you give him necessary guidance regarding interpretation. Henceforth, please stop interrupting him to make observations about minor mistakes, which it would be preferable not to mention until the end of the piece. Even though I have taught very little, I have always followed this method; it trains musicians, which is in sum the essential goal of the art, and it is less fatiguing to both the teacher and the student."⁵⁷

In 1894, Jaëll sought to create a foundation for her touch method using principles from the old school of masters as well as her personal experiences as a teacher and performer, as illustrated by the following directives:

- Suppression of section practice

Jaëll points out how fictitious distinctions between harder and easier sections are unnecessary: *"A succession of four half notes can demand for the interpretation more depth than the most complicated trait."⁵⁸* Because difficulty is the same everywhere, cutting a piece as a mosaic is pointless and creates artificial obstacles for the musical mind.

⁵⁷ "Lorsque Beethoven confia l'éducation musicale de son neveu à Czerny, il lui donna les instructions suivantes: 'Concernant ses études avec vous, je vous prierai de lui faire apprendre à jouer toutes les notes en mesure, et seulement lorsqu'il ne fera plus de fautes et lorsqu'il possèdera un bon doigté, vous lui donnerez les indications nécessaires à l'interprétation. Dès lors, cessez de l'interrompre pour lui faire des observations sur des petites fautes qu'il est préférable de ne lui indiquer qu'à la fin du morceau. Quoique j'aie peu enseigné, j'ai toujours suivi cette méthode: elle forme bientôt des musiciens, ce qui est en somme le premier but de l'art, et elle fatigue moins le professeur et l'élève.'" Ibid, vol II. p. I.

⁵⁸ "Une succession de quatre blanches peut exiger pour l'exécution plus de pénétration que le trait le plus compliqué." Ibid, vol. II, p. I.

- Suppression of dynamics

Adding dynamics or accents can be a way to compensate for an unbalanced sonority. It is necessary first to be able to play all notes with an absolute evenness and quality of touch.

- Suppression of wrong notes starting from the very first reading

Playing a wrong note or repeating the same wrong note again and again causes an irretrievable harm to the music. In this manner, slow practice and an immediate correction of attacks are primordial in the touch study.

- Sitting very low during the practice, and higher during the performance

During the practice, the elbow must be a little bit lower than the arm, in order to immobilize the arm and allow to focus the touch training on fingers. However, Jaëll recommends sitting higher during the performance in order to have more room and flexibility to refine the pressure of the touch.

- Reduction of practice hours

A work on the touch is incompatible with excessive practice as it inhibits observation skills and sensorial attention. If the relationship between the brain and the fingers is becoming slower because of an abuse of practice hours, it is better to interrupt the practice.

The outline of Jaëll's 1894 method, then still at an experimental stage, was already in conflict with the current piano methods of her time, which remained transfixed with the

acquisition of rote automatisms learned at any cost. At the dawning of Jaëll's years of research, these pages set forth a pertinent basis for a new system of studies, based in large part on the actual physical aptitudes of the nervous system and the hand. Jaëll's later experiments further refined and added substance to these early observations, resulting in a more robust and complete understanding of musical learning. The final part of this dissertation will present some of the concrete applications derived in Jaëll's 1899 revision of *Le Toucher*,⁵⁹ in the light of later discoveries. In 1894, Jaëll offered an early glimpse of the instructional message path her later works would hone; specifically, to mobilize the sensorial resources we have in order to serve the music as a language, and not the other way around.

⁵⁹ Jaëll, Marie. *Le Toucher: Enseignement du piano basé sur la physiologie, 3 volumes*, Leipzig - Paris: Breitkopf-Härtel-Costallat, 1899.

3. Music and Psychophysiology

Published in 1896, Jaëll's *La Musique et la Psychophysiologie* was addressed to a more general public than the method outlined in *Le Toucher*. In *La Musique et la Psychophysiologie*, Jaëll shares reflections on the unexplored physiological path she is about to undertake; namely, on her quest to approach musical understanding through the enhancement and refinement of organic activity. Seeing the instrument as the intermediary between the art and the artist, Jaëll specifies in her foreword that her approach should logically be applicable to every instrument.⁶⁰ Even though Jaëll only limited her field of observation to piano since it served her research for an extended period of time, she consistently maintained that any musical instrument has the potential to transform our organic activity into harmonious or discordant sounds.

It did not appear that Jaëll sought any fame or recognition out of her first writing. She always considered herself at an experimental stage of her research and was driven only by a desire to seek truth in the arts using science. In a letter addressed to her friend Gosswine,⁶¹ Jaëll wrote that she immersed herself so much in the completion of this book, that when spring came, she believed she had hibernated all winter long: "*Gossi, are you 'physiological?' If not, I hope you will be one day, because it would be regrettable if such a luminous science did not illuminate*

⁶⁰ "Nous avons dû nous borner à appliquer toutes nos observations au piano, parce qu'il avait servi depuis longtemps de base à nos recherches et que nous serions incompetents si nous voulions analyser d'autres fonctions que celles du pianiste." Jaëll, Marie. *La Musique et la Psychophysiologie*. Paris: Alcan, 1896. Avant-propos.

⁶¹ "Il est terminé, mon nouveau livre. Je m'y suis plongée à tel point que, le printemps venu, j'ai cru avoir dormi tout l'hiver. Mais ceux qui le liront ne doivent pas s'endormir; s'ils ont le sens de ce qui est nouveau. Gossi, es-tu 'physiologique?' Sinon, j'espère que tu le seras un jour, car ce serait bien dommage si cette science lumineuse n'éclairait pas ta route. Tu penses sans doute que j'ai perdu la raison? Nenni, je possède seulement des sens plus développés. Tu comprendras tout cela lorsque tu liras mon livre. Par des mouvements que j'ai trouvés moi-même, je puis apprendre à chacun à réaliser la beauté par le piano. Quel bonheur! Gossi, je suis une veinarde, mais une veinarde active." Kiener, Hélène. *Marie Jaëll, 1846-1925; Problèmes D'esthétique Et De Pédagogie Musicales*. Bibliothèque D'esthétique. Paris: Flammarion, 1952. p. 70.

your path. Now do you perhaps think that I have lost my mind? Not in the slightest, I only have more developed senses. You will understand when you will read my book. I have discovered movements that will potentially allow me to help everyone to realize beauty through the piano. What a joy! Gossi, I am a lucky devil. But an active one."

Indeed, Jaëll's early works did not enjoy the same critical praise as her early performances. One particular scathing review of *Musique et Psychophysiologie* was published in March 1896 in *Revue de Métaphysique et de Morale*, a quarterly journal co-founded in 1893 by Léon Brunschvicg, Xavier Léon and Élie Halévy to address philosophical questions. This short and simplistic review does not give much credit to Jaëll's multidisciplinary approach, instead chiding Jaëll for her writing style and attempts to blur the lines between different fields of study: *"Mrs. Jaëll tackles issues regarding the philosophy, psychology and methodology of her art with an obvious willingness. She has read Helmholtz and Wundt, Spencer, Féré, Binet and many others. It is simply regrettable that philosophy is a profession, like the art of the pianist, and that Mrs. Jaëll's obscure lines of thoughts and venturesome metaphors unveil an insufficient practice of her second job. It is to be regretted, since her reflections concerning muscular and tactile senses in musical thinking, on the pianist's performance methodology, and on listener's impressions, denote a significant erudition and experience."*⁶²

⁶² *"C'est avec une bonne volonté évidente que Mme Marie Jaëll s'attaque aux problèmes qui concernent la philosophie, la psychologie et la méthodologie de son art. Elle a lu Helmholtz et Wundt, Spencer, Féré, Binet et bien d'autres. Il faut seulement regretter que la philosophie soit un métier comme l'art du pianiste, et que Mme Jaëll, par des raisonnements souvent obscurs et enchevêtrés de métaphores audacieuses, trahisse une pratique insuffisamment prolongée de son second métier. Il faut le regretter, car ses réflexions sur le rôle du sens musculaire et du sens tactile dans la pensée musicale, sur la méthode du pianiste qui exécute et sur les impressions du public qui écoute, dénotent de beaucoup d'érudition et d'expérience."* La musique et la psychophysiologie, 1 vol. (Book Review). (1896). *Revue De Métaphysique Et De Morale*, 4(2), 2.

Admittedly, Jaëll's writing can sometimes be sharp and defiant, sometimes lyrical, and her reflections often wander in many different directions. But to shun Jaëll's writings for their lack of brevity would be to banish invaluable input from our collective understanding. *La Musique et la Psychophysiologie* is also not a book that can be read and digested in a day; it is simultaneously a cumulative summary of Jaëll's years of observations and internal interrogations as a pianist, and a starting point for future experiences regarding the interaction between the tryptic sound - hand - thought.

Across ten chapters, Marie Jaëll brings out a diversity of thought-provoking observations and impressions, inspiring interrogations and sharp positions related to these topics:

Chapter I: Le mécanisme de l'expression musicale

(The mechanism of musical expression)

Chapter II: L'attention et le sens musculaire (On attention and muscular sense)

Chapter III: Le toucher et le sens auditif (On touch and auditive sense)

Chapter IV: L'étude (On practice)

Chapter V: La mesure et le tempo rubato (On measure and tempo rubato)

Chapter VI: L'interprétation (On interpretation)

Chapter VII: La pédale (The pedal)

Chapter VIII: Les facteurs de la mémoire musicale (On musical memory's factors)

Chapter IX: L'accélérateur du toucher (On touch's accelerator)

Chapter X: Les sensations des auditeurs (On listener's sensations)

Supported by Jaëll's experience as an accomplished musician in the French artistic world, this first writing contains a pronounced reflection on her contemporary musical life and a resonated departure point towards a new horizon combining art and science. Deploring how musicians consider beauty and music as superior to science, Jaëll exposes from the very start her goal to unify musical sentiment and motor skills, in order to support artists' highest aspirations.⁶³ Jaëll laments that while scientists are willing to expand their knowledge on various phenomena thanks to musical inspiration, it would seemingly never occur to musicians from her time to combine art and science, as they erroneously consider them in opposite fields. While scientists would logically deduct facts from observable causalities and hypothesis testing, artists of Jaëll's time endeavored to be magically elevated to transcendental psychic regions that could only be decrypted through inspired revelations.

Jaëll amusingly notes how all attempts at scientific analysis of these phenomena inspire among her peers *"the instinctive rejection that painters or poets might feel at the idea of studying their art through vivisection."*⁶⁴ Jaëll writes these words in a time where experimental science was quickly developing and her critique towards musicians' regrettable reluctance to bear interest for sciences, if a bit inflated, was manifestly intended as a wakeup call. Later, Jaëll admitted that if artists do not share the same strong interest for science as scholars are able to feel for art, it is because the latter have a better understanding of art than musicians have for science. In this way, artists satisfy themselves with *"sensing through their art the changeless background*

⁶³ *"Unifier, dans l'étude du piano les fonctions motrices et le sentiment musical, c'est donner un appui solide aux aspirations les plus hautes de l'artiste."* Ibid, p. 1.

⁶⁴ *"Toute tentative d'analyse scientifique de ces phénomènes leur inspire l'éloignement instinctif qu'éprouveraient des peintres ou des poètes à l'idée d'étudier leur art en faisant de la vivisection."* Ibid, p. 2.

underlying the life manifestations from the changeful phenomena world."⁶⁵ By comparison, scientists, observing the same manifestations, would endeavor to categorize and generalize them in logically consistent and empirically testable manner suited to their field.

To Jaëll, if science is willing to learn from art, then art should be willing to learn from science. She understood that the superficially noble quality of undefinable artistic inspiration and intuition has its limits. Jaëll also cautioned that excessive admiration of the mysterious essence of the musical sentiment generates ignorance and incompetence, as it fails to establish a more complete understanding of fundamentals cause and effect relationships. In this manner, Jaëll strongly condemned the contemporary discourse addressed to young music students: "*If it is their destiny to be musician, they have been assured, light shall spring through a spontaneous manifestation of their intuition, because the greatness and the mysterious quality of art lies in the fact that its essence can't be communicated, it must be carried within oneself.*"⁶⁶ This caricatural belief is to her a "*false and sterile cult*" that creates "*disoriented musicians.*"⁶⁷ Worse, it generates a vain dissociation between materiality and spirituality, between finger mechanism and musical expression. Quoting Leibnitz: "*If men were more thorough in observing the overt movements which accompany their passions, it would be hard to disguise them.*"⁶⁸ Jaëll saw the

⁶⁵ "*Les musiciens sont satisfaits de pressentir à travers leur art le fond immuable des manifestations de la vie; les savants voient réapparaître ces manifestations de la vie dans chaque problème soulevé, ils les généralisent sous maintes formes différentes qui leur sont également proches et familières.*" Ibid, p. 162.

⁶⁶ "*S'ils sont destinés à devenir des musiciens, leur a-t-on assuré, la lumière jaillira par une manifestation spontanée de leur intuition, car la grandeur, le mystère de l'art réside dans le fait que sa vie ne peut être communiquée, il faut la porter en soit.*" Ibid p. 3.

⁶⁷ "*Ne voit-on pas, par le grand nombre d'exécutants désorientés, que c'est un culte faux et stérile qui ne profite guère à ceux auxquels on enseigne l'art?*" Ibid p. 3.

⁶⁸ Leibniz, G., Remnant, Peter, & Bennett, Jonathan. (1981). *New essays on human understanding*. Cambridge [England] ; New York: Cambridge University Press. p. 169.

value in developing an artistic mechanism that would *"shape the outward movements of the passion of the musical language."*⁶⁹ The obscure mechanism commonly used to approach the musical language should, according to Jaëll, be replaced by a one embracing a deep and meticulous knowledge of the physiological functions that produce the art.

This more empirical understanding of the interplay between physiology and music would allow musicians to render a higher quality performance, especially because it would illuminate how unique physiological conditions produce the best musical performances, which were *"still considered as being the privilege of rare organisms, of which Liszt and Paganini remain the exceptional representatives."*⁷⁰ Science should, in this way, be considered as an invaluable ally since it has the potential to help us define this special physiological state and to contribute to solving aesthetic mysteries by acquiring knowledge regarding the fusion of physical and psychological state. For many musicians, the movement and thought that create their music act as a singular unconscious force. But the unconsciousness of this fusion fools many musicians into thinking that music is born of ethereal inspiration, rather than their physiological potential. Metaphorically, if fingers, helped by a conscious action from the mind, are able to *"draw on the keyboard signs of musical language,"* the *"musical esotericism will no longer exist"* and the *"musician's prerogative will generalize."*⁷¹

⁶⁹ *"Voilà précisément en quoi consiste le rôle du mécanisme artistique: il doit former les mouvements extérieurs de la passion du langage musical qui, forcément, seront tout différents des mouvements réalisés sans cette intention prédominante."* Jaëll, Marie. *La Musique et la Psychophysiologie*. Paris: Alcan, 1896. pp. 3-4.

⁷⁰ *"Affirmons dès à présent, qu'en principe, la réalisation de la beauté esthétique exige chez l'exécutant un état physiologique spécial, considéré comme un privilège exclusif de certains organismes dont Paganini et Liszt sont restés les représentants exceptionnellement supérieurs."* Ibid p. 4.

⁷¹ *"Si l'esprit musical peut être manifesté par des actions matérielles déterminées, transmises aux doigts, les prérogatives du musicien pourront se généraliser. L'esotérisme du langage musical cessera d'exister. Les doigts traceront sur le clavier des mouvements qui transmettent l'expression, comme les signes d'une écriture transmettent la pensée."* Ibid p. 8.

Digging deeper, Jaëll states that we can see in the current musical teaching the misguided ways of old psychology, when the *"soul was considered as an entity creating phenomena."*⁷² In the same manner, musical skills are commonly and mistakenly considered as innate gifts that can generate auditory phenomena. But how can some people have the innate faculty to sense the music while this faculty is nonexistent in others? The forward-thinking Jaëll rejects this notion, believing that the true understanding of the music lies in the mind. In other words, it is not enough to learn how to read music, how to play the piano, how to memorize, or how to perform. Indeed, before even considering mastering one of these skills, one must learn how to think the musical notes, and make physiological and aesthetic laws work together in a meaningful and harmonious way. Correspondingly, Jaëll calls to fight the state of unconsciousness in the art, being in this manner in tune with her time. In fact, unconsciousness suggests *"mawkish efforts, lacking real conviction, without effective ardor,"*⁷³ and it should be art and science's shared objective to fight it.

a. The Training of the Fingers

One of the first act of willful intelligence in the study of piano is to develop the muscular action of the fingers and the quality of attention at a higher degree. Unfortunately, it is possible to acquire a greater finger agility through a poor and unconscious use of the muscle functions.

Jaëll compares the muscular body of these musicians to *"a harp for which all strings remain*

⁷² *"On suit dans l'enseignement musicale les errements de l'ancienne psychologie, où l'âme était considérée comme une entité qui cause des phénomènes. On considère de même les facultés musicales comme un don inné produisant les phénomènes de la beauté esthétique."* Ibid p. 8.

⁷³ *"L'inconscience suggère les efforts mièvres, sans conviction réelle, sans ardeur effective."* Ibid, p. 158.

slack or out of tune."⁷⁴ The act of pressing the key is very simple, but it is this relative simplicity that distorts our perception of the physiological process that produces the sound. If we contract a finger and let it fall vertically on a key, another impulsion will be needed to lift the finger from the key, and it will take two opposite actions to produce one sound. To Jaëll, this simplistic back-and-forth pattern is *"contrary to the laws of muscular elasticity, based on the fusion of successive small vibrations, they cannot then be useful to the progress of the individual organism that every performer must pursue and achieve."*⁷⁵ This is the result of an unconscious, repetitive, and stubborn instrumental practice, where clumsy gestures are eventually corrected if they reach the consciousness of the musician.

One of the most underestimated and crucial causes of functional muscular impotence is the insufficient immobility of the fingers before they attack the key. This notion may lead to confusion because of the traditional technical exercises that require some fingers to stay still and immobile on the key, while the others repeat a mechanical action, in order to develop their autonomy. The immobility Jaëll refers to has nothing in common with this conception but correlates with the static action of the muscular tension and the perfectibility of the musical gesture's mental representation before the emission of the sound. This voluntary immobility creates a subtle shift of the physiological state that contains the initial force responsible for the musical expression. The responsiveness of our body, so crucial in an artistic development, will always equate to the degree of attention specific to each individual. Jaëll states in this way that

⁷⁴ *"L'organisme de ces exécutants porte en lui-même une négation de l'art; il ressemble à une harpe dont toutes les cordes resteraient détendues ou mal accordées."* Ibid, p. 18.

⁷⁵ *"Ces procédés sont contraires aux lois de l'élasticité musculaire, basées sur la fusion des secousses successives; ils ne peuvent donc pas être utiles aux progrès de l'organisme individuel que tout exécutant doit poursuivre et atteindre."* Ibid, p. 20.

the "*mechanism of attention resides in the muscles, that, such like rubber bands, warm up as they contract.*"⁷⁶ And this mechanism is indefinitely perfectible, as long as it is not wasted by a low-quality drowsy practice.

In this regard, Jaëll strongly cautions against the adverse effects of accumulation of hours of practice. She ironically compares this abusive way of learning music to the trance rituals exerted by the Aissaouas,⁷⁷ as they were trying to reach mystical exaltation through an auto-oscillation of their head, which in turn made them increasingly unconscious of their motion, and allowed them to reach a trance-like state. Similarly, spending hours developing unconscious gestures at the expense of the cerebral activity creates a state of intoxication that can only have a negative impact on art. Hence, Jaëll points out how the way we use our physical functions can present toxic properties in the context of music learning: "*At low dose, it is medicinal, at a higher dose, it is destructive.*"⁷⁸

b. The Training of the Musical Thinking

The higher function in art is the creative thinking, and it has to manifest itself last in the artistic process. First, one must know "*how to operate,*" then learn "*how to act*" and finally "*how to think.*" In other words, "*the action of one's fingers must be trained in anticipation of the*

⁷⁶ "*Le mécanisme de l'attention réside dans les muscles, qui, de même que des fils de caoutchouc, s'échauffent en se contractant.*" Ibid, p. 17.

⁷⁷ The Aissaouas's brotherhood was founded in the Fifteenth-Century in Morocco. The Aissaouas were mostly known for their use of music and symbolic dances in their ceremonies, used as a way to bring the disciples to an ecstatic trance.

⁷⁸ "*Pour l'enseignement de la musique, la fonction organique a la propriété des toxiques; elle est médicamenteuse à faible dose; à forte dose elle est destructive.*" Ibid, p. 54.

thinking that will come forth."⁷⁹ To Jaëll, the expression of the musical thought is a communication of motions. These motions transmit to the brain the mechanism of the musical aesthetic through tactile sensations and auditive perceptions, in order to exchange the human motor mechanism for a musical one. The performer who has not perfected his motor functions to an artistic end will fail to render the true expression of the musical work and will instead provide repetitive effort to refine the surface and contours of the piece. If not in the right physiological disposition, the performer will just fail to express the underlying musical thought, and *"every effort will produce a lax, inaccurate, distorted, caricatural trait."*⁸⁰ Paradoxically, prolonging practice sessions may sometimes give the impression of coming closer to the music. But this illusion of truth is generated by the appreciation and good consciousness of the effort.

Furthermore, attention does not improve if its duration is increased; instead, it declines and unwittingly generates a physical tiredness. Thus, the connection between the cerebral commandment and the finger action weakens and the practice switches to an auto-pilot mode that annihilates the intelligence of the musical understanding. In this way, Jaëll asserts that an hour and thirty minutes to two hours a day of practice time can be enough to achieve a great understanding and execution of the most complex works. If necessary, practice can be extended to three hours maximum, as long as the practice session is divided in half or thirds and limits itself to the extreme refinement of the artistic mechanism. Once again, Jaëll stresses: *"We thus*

⁷⁹ *"Dans le mécanisme artistique, il faut d'abord savoir comment agir; ensuite apprendre à agir et finalement penser, ce qui équivaut à dire que l'action des doigts doit être formée en prévision de la pensée qu'elle devra faire naître, comme notre propre organisme a préexisté à nos fonctions intellectuelles qui sont indissolublement unies à lui."* Ibid, p. 55.

⁸⁰ *"L'exécutant qui n'a pas perfectionné la fonction motrice initiale des attaques aura beau vouloir, par l'étude, reproduire fidèlement chacun des traits de l'image expressive d'une oeuvre musicale, il est impuissant à en réaliser un seul; chaque effort produit un trait relâché, inexact, faussé, caricatural."* Ibid, p. 71.

find in the defectiveness of the execution the pitiless consequences of the alleged dualism that exists between the mechanism and the expression, the body and the soul."⁸¹ The errors of musical thinking are dependent on inaccuracies of the motor functions. But it is the responsibility of the pianist to convert internal effort into an effortless gesture that is the music.

Among the more abstract, but no less thought provoking, views in *Music and Psychophysiology* is the thought that the nature of the work performed has the power to shape the performer's imagination by creating an uninterrupted transmission of influences. To Jaëll, the music itself has the ability to educate and challenge the musician's infinite conscience. Here, Jaëll takes a temporary detour from her advocacy of physiology to emphasize how the main purpose of her scientific approach remains Music.

Playing Schumann will, for instance, help musicians to propel their imagination within a framework of representations that are easy to seize. Schumann is an initiator for whoever wants to learn how to think in music. His *"expressivity relies on a dense musical structure that can provide a solid support for performers whose thinking would not be able to grasp more refined concepts."*⁸² In this way, Schumann is suitable to help express the very first manifestations of musical thinking.

Additionally, Chopin's music will raise poetic impressions that won't be as deeply filled with imagery and intimate feelings as Schumann's, but will allow the performer to focus more on the subtleties of piano playing. The poetic content of Chopin's music helps to reinforce the

⁸¹ *"Nous retrouvons donc dans la déféctuosité de l'exécution les conséquences impitoyables du prétendu dualisme existant entre le mécanisme et l'expression, entre le corps et l'âme."* Ibid, p. 71.

⁸² *"L'interprète apprendra, en jouant des oeuvres de Schumann, à mouvoir son imagination dans un cadre de représentations proches, faciles à saisir. . . . Son expressivité a une charpente musicale si serrée, qu'elle prête un appui sûr aux exécutants dont la pensée ne saurait être susceptible de saisir des conceptions plus subtilement réalisées. Les premières manifestations de la pensée, Schumann sait le mieux les communiquer."* Ibid, p. 102.

fingers and the thinking, as long as the interpreter does not distort it with an irregular rhythm and an overly exaggerated and unjustified use of extreme dynamics. Jaëll states that Chopin's writing is *"conformed to the musical thinking he expressed throughout all his works, with a lucidity of means that prevents anyone from altering, in any way, the precise indications which he used to transmit it."*⁸³

Jaëll found a particular source of enlightenment through her study of Liszt. After discussing the potential of Liszt's music influence on the musician's brain, Jaëll elaborates further. She observes the way sounds were being processed in Liszt's brain; just like a calculator's intelligence that can not only process numbers, but solve them with breakneck speed. In this way, music study necessitates a fusion of the physiological and intellectual mechanisms, and an ability to communicate to the brain a range of combinations considerably more advanced. Jaëll explains how Liszt's music, *"more than any other, demands a double creation: the composer's and the performer's, which needs to come closer to the composer's genius in order to enter the creative's sphere."*⁸⁴ This strong statement could also apply to other composer's music. But Jaëll, who pays tribute to a friend and colleague she held in the highest esteem, explains the reasons of this distinction: more than any other pianist composer, Liszt expected an intense communion between his music and the interpreters. He wanted his music to act like a magnetic force, and allow performers to feel as free as if they were expressing their own thought through

⁸³ *"Chopin était un musicien de haute race; son écriture était conforme à la pensée musicale qu'il exprime à travers toutes ses oeuvres, avec une lucidité de moyens qui dispense chacun de modifier, en quoi que ce soit, les indications précises dont il s'est servi pour la transmettre."* Ibid, p. 103.

⁸⁴ *"Ces oeuvres, plus que d'autres, ont besoin d'une double création: celle du compositeur, celle de l'interprète, qui doit en quelque sorte être apparentée au génie du compositeur pour pénétrer dans la sphère de ses créations."* Ibid p. 105.

his music: *"This is the principal innovation contained in Liszt's works: the blossoming of his own thought only appeared to him within the radiance communicated by a collective thought."*⁸⁵

Jaëll thought that while Liszt required the performers to transcend their technique and imagination in order to embody his music, to study Bach would teach them some humility. To Jaëll, Bach's music presents a double phenomenon: eternally audible, it renders the impression of an eternal silence. Impassive, it seeks to introduce to musicians' conscience the following premise: *"Knowing everything, expressing everything while being moved by nothing."*⁸⁶ In this manner, Bach's music encourages musicians to be at the same time impassible and present, like an omniscient narrator. To Jaëll, *"without the work of Bach, which seems to disapprove of emotivity rather than suggesting it, our artistic conscience would be incomplete. The fact is, Bach had to exist in order for Beethoven to be born."*⁸⁷

Beethoven's music addresses humanity's conscience and has a philosophical power that allows the performer to ally his musical sensitivity to a sense of human dignity. To Jaëll, Beethoven inspires *"the resistance against anything inferior and an aspiration towards all that is superior. To understand his work is to feel that it can deliver us from the petty conception of*

⁸⁵ *"C'est là l'innovation principale renfermée dans les oeuvres de Liszt; l'épanouissement de sa propre pensée ne lui apparaissait que dans le rayonnement communiqué à une pensée conjointe."* Ibid p. 105.

⁸⁶ *"Eternellement sonore, elle donne l'impression d'un éternel silence. . . . Dans son impassibilité, comme dédaigneuse d'elle-même, elle tend à introduire dans la conscience du musicien cet axiome: 'Connaître tout, exprimer tout, et ne s'é mouvoir de rien.'" Ibid, p. 106.*

⁸⁷ *"Sans l'oeuvre de Bach qui ne suggère pas l'émotivité, mais semble la réprouver, notre conscience artistique serait incomplète...c'est que Bach a dû exister pour que Beethoven puisse naître."* Ibid, p. 106.

life."⁸⁸ To such a degree, art must not only be a *"high reason, but a morale high ground, a restraint, an impulsion, a progress."*⁸⁹

c. Pedal and Memorization

Although the full content of Jaëll's observations is too dense to be synthesized here, two points necessitate some attention: pedal and memorization. To Jaëll, a poor use of the pedal has the same negative impact on the brain and the senses as a wrong pair of glasses would have on the eyes by creating a blurry vision. In this way, vague sensations of the pedal or an automatic use of the feet are detrimental not only on the music, but on the mental action of the performer. But, reciprocally, an intelligent use of the pedal helps the musician how to think.⁹⁰

Moreover, using the pedal requires mastering a double independence: an independence between the pedal and the hands, and an independence between feet and rhythm. In particular, it imports one to break the automatic pattern that consists in lifting the pedal on strong beats. By refining the speed of feet reaction, the various degrees of pressure and release, and the timing, the pedal should be used for artistic purposes only — as a light, as a color, as a spatial enlargement. As Jaëll states, if pedal is a great tool, *"the art of using it as little as possible is the*

⁸⁸ *"Heureux ceux sur lesquels son souffle passe! Ils se sentiront devenir plus forts, car il ne leur inspirera pas le désir d'assouissements incessants, mais la résistance contre tout ce qui est inférieur, l'aspiration vers tout ce qui est supérieur. Comprendre son oeuvre, c'est sentir qu'elle nous délivre de la conception mesquine de la vie."* Ibid, p. 108.

⁸⁹ *"L'art doit être non seulement une haute raison, mais une haute morale, un frein, une impulsion, un progrès!"* Ibid, p. 108.

⁹⁰ *"Un mauvais emploi de la pédale agit sur l'action mentale de l'exécutant comme des lunettes qui sont mal adaptées; par contre, une application intelligente de la pédale peut en quelque sorte aider le musicien à penser."* Ibid, p. 109.

surest way to be a faithful interpreter; the most artistic means of translating musical expression are certainly those employed by one's fingers."⁹¹ Essentially, learning how to be deprived of the pedal, without affecting the liveliness of the playing, will help the musician to form judgment on its veritable use.

Jaëll's insights on the use of pedal are helpful, but may not be particularly novel to contemporary readers. Practicing with no pedal is now an acknowledged practice technique, though it necessitates a constant auditive and sensorial refinement. On the other hand, Jaëll's thoughts on memorization are more directed. Indeed, she believed that working in small sections and repeating them as means of memorization is a misconception, one detrimental to music memory. To Jaëll, segmented practice creates obstacles, doubts, difficulties as it interrupts the flow of musical learning. Fragmentation and arbitrary repetitions are an *"anti-artistic method"* and can be suppressed by the study of the touch, which will have a much more direct influence on memory since it activates muscular, auditive, and visual functions.⁹² Musical memory will in this manner be irregular or smooth, slow or fast depending on the musical information transmitted by the fingers.

A conscious and intelligent playing helps memory function in a regular, easy, and reliable way. By comparison, rote memorization contracts the defects of an unintelligent and saccadic way of playing that lacks physiological understanding. Jaëll mentions French anatomist Gratiolet who introduced the demarcation of the brain into five lobes and was particularly interested in the

⁹¹ *"L'art de s'en servir le moins possible est là encore le moyen le plus sûr d'être un interprète fidèle, car les moyens les plus sûrement artistiques pour traduire l'expression seront ceux employés par les doigts."* Ibid, p. 114.

⁹² *"L'étude du toucher, qui supprime ces procédés anti artistiques, a sur le développement de la mémoire une action directe, qu'elle se manifeste plus spécialement par les fonctions du sens musculaire, du sens auditif ou du sens visuel."* Ibid, p. 117.

ability to spatialize. Jaëll reports that the facility to visually coordinate, measure and feel the muscular sensations helps acquiring a conscious memory, where sounds are heard through an internal resonance before being transposed to the piano.⁹³ If the mental audition of the musical memory is activated, Jaëll believes that even those who don't have musical ability, who cannot discern intervals or wrong notes, will be able to play from memory complex chords successions.⁹⁴ This memory is similar to an auditive compass, has the ability to guide performers' actions, and is infinitely perfectible thanks to the refinement of the physiological functions and the energy of the will.

d. The Listener's Sensations

Finally, in her last chapter entitled 'on listener's sensation,' Jaëll starts with a simple observation; namely, that the *"same piece, heard by hundred people at the same time, can produce such diverse impressions,"* and that the intrinsic value of a work of art is at first disconcerting.⁹⁵ She also remarks that listeners are being oriented in the way they listen by a conventional compass. Assimilating these *"unconscious listeners"* to *"mesmerized subjects that*

⁹³ "Gratiolet dit plus loin: 'Coordonner, c'est mesurer, et mesurer, c'est sentir'; il détermine ainsi la plus haute portée artistique des sensations musculaires par lesquelles on peut en quelque sorte mesurer, à travers des mouvements métaphoriques, l'expression musicale dans ses rapports les plus subtils. C'est par cette faculté de mesurer les rapports des mouvements que l'on peut acquérir aussi cette mémoire consciente dans laquelle les notes sont entendues par une résonance intérieure, et ensuite transmises au piano." Ibid, p. 120.

⁹⁴ "Néanmoins, ceux mêmes qui n'avaient pas d'oreille musicale, qui ne discernaient aucun intervalle et ne remarquaient pas les fausses notes qu'ils jouaient s'ils ne les voyaient pas en regardant fonctionner leurs doigts sur les touches, arriveront à jouer par coeur des enchaînements d'accords compliqués, dès que les auditions mentales de leur mémoire musicale fonctionneront plus activement." Ibid, p. 121.

⁹⁵ "Le même morceau, entendu à la fois par cent personnes, peut produire des impressions tellement différentes qu'on est tout d'abord dérouté sur la valeur intrinsèque qu'une oeuvre d'art peut réellement avoir, en voyant le désordre des appréciations contradictoires qu'elle peut faire naître." Ibid, p. 152.

can be convinced of anything,"⁹⁶ Jaëll notes how they feel obligated to admire what they believe has been admired by others. Reversely, they may miss the beauty of an art work if its creator is unknown.

It may not seem so, but listening to music is just as difficult, if not more so, than interpreting it. As obvious as it seems, performers as well need to develop their listening skills so they can actually hear themselves play. To this extent, Jaëll adds that *"in order to be an admirable interpreter, it is first necessary to be an admirable auditor."*⁹⁷ Indeed, having the ability to play the piano does not guarantee being able to think in music, especially since it is the former skill that is preferred in the process of music learning, as it has a more immediate, tangible and reward result. Jaëll explores a path full of potential when she states that it is the responsibility of the music teacher to prove that *"the musical sentiment is not necessarily an unconscious power, but that it can be created by the intellectual effort under whose impulse the performer transforms the movements of their fingers and their physiological state."*⁹⁸ Because great artists are able to think the notes through this process, they have a superior auditive capacity that allows them to hear connections in the music that escape the attention of most musicians.

⁹⁶ *"Les auditeurs inconscients ressemblent à s'y méprendre aux sujets hypnotisés, auxquels on peut faire tout accroire."* Ibid, p. 154.

⁹⁷ *"Savoir écouter la musique n'est pas seulement une qualité que l'auditeur doit nécessairement avoir, mais qu'il importe avant tout de développer chez l'exécutant, afin qu'il s'entende lui-même jouer. Pour être un admirable interprète, il faut être avant tout un admirable auditeur."* Ibid, p. 160.

⁹⁸ *"L'enseignement de la musique doit prouver que le sentiment musical n'est pas nécessairement une force inconsciente, mais qu'il peut être créé par l'effort intellectuel sous l'impulsion duquel l'exécutant transforme les mouvements de ses doigts et l'état physiologique de son organisme."* Ibid, p. 162.

In this way, it is the responsibility of both the musician and the audience to recreate a musical work: *"This is the mysterious strength of music; in appearance, it combines the reflections of multitudes. The musical language that everyone seems to understand is a sympathetic connection that makes human beings feel a sense of belonging to a community of origin, a shared ideal, an ability to be moved by the same attractions."*⁹⁹

e. The Social Dimension of Musical Understanding

Jaëll addresses here another dimension to musical consciousness; the social dimension. If there is an important abyss between the sensorial pleasure music creates in some and the intellectual enjoyment it generates in others, the fact remains that music is one of the driving and common unifying forces for our civilizations.

Jaëll was certainly aware of the avant-gardiste character of her venture to prove that close relationship of art and science. She amusingly noticed in a letter to her friend how seemingly nobody in Paris knew of her book. According to her, three people liked it: *"a student, Jeanne Bosch, an artist: Camille Saint-Saëns, and a scientist: Charles Féré."*¹⁰⁰ Still, *La Musique et la*

⁹⁹ *"C'est là ce qui fait la force mystérieuse de la musique; elle fusionne en apparence les pensées des multitudes: le langage musical que tous paraissent comprendre est un lien sympathique qui fait sentir aux être humains une communauté d'origine, une parenté d'idéal, une capacité de s'émouvoir par les mêmes attractions."* Ibid, p. 157.

¹⁰⁰ *"Tu me demandes ce qu'on dit de mon livre à Paris? Eh! rien du tout! Il a plu à trois personnes; à une élève: Jeanne Bosch, à un artiste: Camille Saint-Saëns, à un savant: Charles Féré."* Kiener, Hélène. *Marie Jaëll, 1846-1925; Problèmes D'esthétique Et De Pédagogie Musicales*. Bibliothèque D'esthétique. Paris: Flammarion, 1952. p. 70.

Psychophysiologie was translated a few years later into Spanish,¹⁰¹ then German.¹⁰² Jeanne Bosch loyally taught Jaëll's method in Holland until the end of her life.

Those that read Jaëll's book were rewarded with a wealth of unexpected insights. A few years after the book's publication, Camille Saint Saëns discovered Jaëll's book and describes the resulting epiphanies with wonder: *"Its substance and form seem equally admirable. One could not better think nor better say, express more clearly things that are more instructive and more judicious, more beautiful and more true... This little book will follow me everywhere."*¹⁰³

Interestingly, the most prompt and enthusiastic response to Jaëll's work came from a scientist, Dr. Féré, who resonated with Jaëll's statement that men of sciences share more interest for art than artists do for scientific matters. A renowned psychiatrist, Charles Féré was so interested by the content of *Music and Psychophysiology* that he offered Marie Jaëll to collaborate with him to bring his experimental methods, a free access to his laboratory, and his knowledge of the topic. After working as Charcot's assistant, the founder of the French neurology, Dr. Féré had been appointed chief medical officer at the Hospice Bicêtre in 1887. His work contained a great amount of facts and experiments that were freed from metaphysical concerns. His research areas included neurological functions, criminality, psychiatry, animal magnetism, pathology of emotions, darwinism, hypnosis and heredity. In addition, he was particularly interested in the

¹⁰¹ Jaëll, Marie. Lloret de Ballenilla, Josepha, trad. *La Musica y la psicofisiologia*. Madrid: impr. Del cuerpo del administración militar, 1901.

¹⁰² Jaëll, Marie. Kromayer, Franziska, trad. *Die Musik und die Psycho-Physiologie*. Strasbourg: Strassburger Dr.-u. Verl, 1905.

¹⁰³ *"Je n'ai pu encore qu'entr'ouvrir votre livre et j'ai été ébloui des rayons qui en sont sortis. Le fond et la forme m'en paraissent également admirables. On ne peut mieux penser ni mieux dire, exprimer plus clairement des choses plus instructives et plus judicieuses, plus belles et plus vraies. Ce petit livre me suivra partout."* Kiener, Hélène. *Marie Jaëll, 1846-1925; Problèmes D'esthétique Et De Pédagogie Musicales*. Bibliothèque D'esthétique. Paris: Flammarion, 1952. p. 71.

function and potential of the hand. In the same year, 1896, he published articles about the hand physiology entitled "*Hand, prehension and touch*"¹⁰⁴ and "*Fingerprints in the study of hand's functions*"¹⁰⁵ and timing could not have been more perfect for his collaboration with Marie Jaëll.



Dr. Féré's lab, Hôpital Bicêtre in Paris, where Jaëll and Féré conducted their experiments from 1897 to 1907.
Document BNU Strasbourg.

¹⁰⁴ Féré, Charles. "La main, la préhension et le toucher." *Revue Philosophique* 41 (1896): 592.

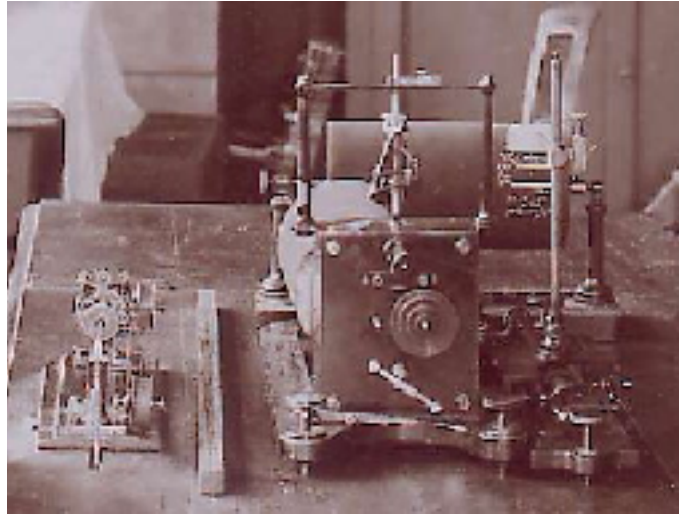
¹⁰⁵ Féré, Charles. "Des empreintes digitales dans l'étude des fonctions de la main." *Comptes rendus des séances de la Société de Biologie* (1896): 1114.

D. DECISIVE DISCOVERIES

Aided by her collaboration with Féré, Jaëll worked tirelessly on analyzing physiological experiments in order to establish a permanent method. Her later writings mostly compile observations and results from her research and are certainly not the type of books that can be studied and absorbed in one day. They reflect Jaëll's diligent daily methodology, consisting of constant physiological research using her own sensations and experiences as a pianist, extensive readings of scientific books, meticulous daily observations of diverse phenomena related, and concrete laboratories experiments with Charles Féré. The results of Jaëll's collaboration with Féré from 1897 until Féré's death in 1907 helped to support many of the hypotheses Jaëll developed based on her earlier experiences and intellectual instinct.

Jaëll gives a glimpse of this productive collaboration between music and science in a letter to a student: *"From 1897 until 1907, I didn't work alone. Dr. Féré communicated all of his research to me, as I shared mine. It is at 14, rue de Tournon, that he made me perform repeated forms of the same chord. He compared the touches made by each finger and told me: 'they are all the same, so it is conclusive.' I pursued the task with a relentless interest, which caused me to discover what you know . . . I was looking for the correct movements, and through these movements, I have found harmony of the touch, musical memory, ear perfectibility, all these faculties that are dormant within ourselves. These movements have consistently been experimentally controlled at Dr. Féré's lab in Bicêtre. Pursued for 10 years, these chronometric experiences have established the unexpected fact that automated finger movements are subject to*

delays that make some pianists look delayed or feeble-minded.¹⁰⁶ On the contrary, a movement that has been thought through, a correct move, accelerates students' reaction time as it perfects itself.¹⁰⁷



Arsonval chronometer that Jaëll and Féré used to measure the speed of students' fingers impulses.
Document BNU Strasbourg.

Without having our modern technological tools at her disposal, Marie Jaëll used original methods to conduct her experiments. She timed the rapidity of her student's finger response and

¹⁰⁶ Charles Féré and Jaëll used an Arsonval chronometer, as depicted above, to measure the speed of students' fingers nervous impulses. This chronometer was accurate to one hundredth of a seconds. They concluded that the finger impulses of pianists who were over-practicing were slower than a beginner's fingers impulses.

¹⁰⁷ ". . . de 1897 à 1907, je n'ai pas travaillé seule, le docteur Féré me communiquait toutes ses recherches comme je lui communiquais les miennes.

C'est au 14, rue de Tournon, qu'il m'a fait faire les empreintes répétées d'un même accord. Il a comparé entre eux les touchers effectués par chaque doigt et m'a dit: 'Ils sont pareils, donc c'est concluant.' J'ai continué la besogne avec un intérêt acharné, qui m'a fait trouver ce que vous savez... J'ai cherché les mouvements justes et par ces mouvements j'ai trouvé l'harmonie du toucher, la mémoire musicale, le perfectionnement de l'oreille, toutes facultés qui semblent sommeiller en chacun de nous. Ces mouvements ont sans cesse été contrôlés expérimentalement au laboratoire du Dr. Féré à Bicêtre. Poursuivies à travers une dizaine d'années, ces expériences chronométriques ont établi le fait imprévu que les mouvements des doigts automatisés, subissent des retards qui font ressembler certains pianistes à des arriérés, à des faibles d'esprit — tandis qu'au contraire, le mouvement pensé, le mouvement juste, accélère, à mesure qu'il se perfectionne, les temps de réaction de manière à permettre à mes élèves, de répondre au signal du chronomètre avec une précision acquise seulement par de fortes intelligences." Kiener, Hélène. *Marie Jaëll, 1846-1925; Problèmes D'esthétique Et De Pédagogie Musicales*. Bibliothèque D'esthétique. Paris: Flammarion, 1952. p. 72.

used fingerprints to study the diverse regions of the finger pads and their relationship with the sound. With a relentless patience, quality of observation, analysis, and deduction, Jaëll approached her research as a scientist, comparing her findings and drawing conclusions from observable and testable phenomena. The following pages will attempt to provide an accurate depiction of Jaëll's unique path and focus on her findings about the relationship between the touch and the musical thinking, through the medium of the hand. A more thorough examination of every aspect of her explorations and comparing it at the light of our time's advancements on the matter should ideally be the object of another work, but in the spirit of Jaëll, it would necessarily demand a collaboration with the scientific world.

1. Mechanism of the Touch

Published in 1897, the ideas expressed in *Le Mécanisme du Toucher* ("Mechanism of the Touch")¹⁰⁸ complement those of *La Musique et la Psychophysiologie*. Encouraged by her first experiments with Charles Féré, Jaëll asserts in the opening sentence that "*the reform of the musical teaching on a scientific basis is now only a matter of time.*"¹⁰⁹ By analyzing degrees of perfectibility of the touch in different performers, Jaëll and Féré discovered striking dissimilarities regarding their initial conception of the keyboard. For instance, depending on the gestures executed and the experience of the player, the mental representation of the physical dimensions of the keyboard varies. The keyboard seems small to an accomplished pianist because the transmitted movements are effortless. Comparatively, the keyboard will appear large to poor pianists, and the slightest gesture will cost additional efforts that will give them the illusion that the jumps they realize on the keyboard are more spread out, and that the keys are more resistant and heavier than they actually are.¹¹⁰ Likewise, a well-trained artist has the ability to sight read a work admirably, memorize it quickly and process it in the long term memory, because there is a correlation between the movements realized and the actual result. Reciprocally, a poor performer will distort a work when sight-reading, but will memorize it using

¹⁰⁸ Jaëll, Marie. *Le Mécanisme du toucher, l'étude du piano par l'analyse expérimentale de la sensibilité tactile*. Paris: Armand Colin, 1897.

¹⁰⁹ "*La réforme de l'enseignement musical sur une base scientifique n'est plus aujourd'hui qu'une question de temps.*" Jaëll, Marie. *Le Mécanisme du toucher, l'étude du piano par l'analyse expérimentale de la sensibilité tactile*. Paris: Armand Colin, 1897. Foreword.

¹¹⁰ "*Au grand pianiste le clavier paraîtra d'autant plus petit que tous les mouvements qu'il transmet lui coûtent moins d'efforts. Au mauvais exécutant le clavier paraîtra au contraire très agrandi parce que les moindres mouvements lui coûtent des efforts conscients ou inconscients qui lui font croire que les écarts qu'il réalise sont plus grands et les touches qu'il enfonce plus résistantes, plus lourdes.*" Ibid, préface VI.

"anti artistic procedures."¹¹¹ As a result of repetitive and incorrect memorization patterns, the work will not remain in the memory for a very long time, due to the disconnect between memory and the accuracy of physiological motions.

These truths established, Jaëll asserts how the *"refinement of sensations and movements imposes itself in the study of art; one cannot teach in the true meaning of the word without thinking of the movements performed and the sounds evoked. To exercise this suggestive power, it is necessary to perfect the organism by perfecting the tactile apparatus."*¹¹² This perfectibility can be developed through the development of muscular static force, and through the analysis of the mechanism of the touch. And in order to analyze the perfectibility of the impulses transmitted on the strings by the touch and the quality of the diversifications of touches, Jaëll, who was not working with advanced technology, used a combination of intuition and experimental analysis to study fingerprints in order to gain knowledge on tactile sensitivity.

The artistic and scientific nature of Féré and Jaëll's collaboration is evident in the unique vocabulary that permeates the work, combining medical terms with more figurate words, and contrasts with the metaphoric style of *Musique et Psychophysiologie*. An illustrative discussion of several of these terms follows.

¹¹¹ *"Ces différences initiales expliquent aussi pourquoi un mauvais exécutant défigure une oeuvre musicale jouée à première vue ou non, qu'il la retient par coeur par des procédés anti-artistiques et l'oublie s'il ne la rejoue pas souvent. Ces faits sont la conséquence des mouvements qu'il réalise et qui diffèrent absolument de ceux réalisés par un pianiste dont le jeu est musical et la sonorité harmonieuse."* Ibid, préface VII.

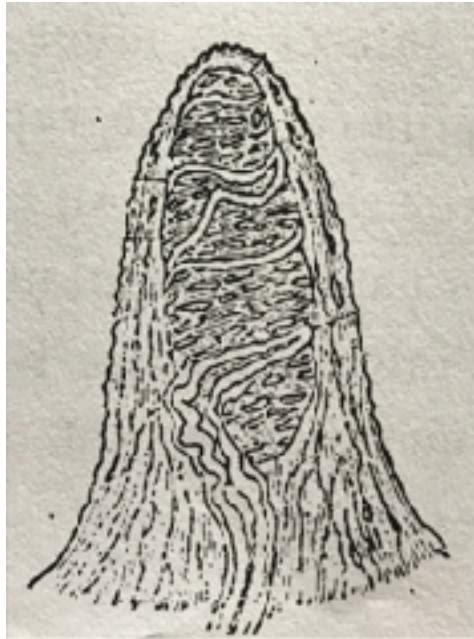
¹¹² *"Ces vérités établies, l'affinement des sensations et des mouvements s'impose dans l'étude d'art: on ne peut instruire dans le vrai sens du mot sans faire penser les mouvements exécutés et les sons évoqués. Pour exercer cette puissance suggestive, il est nécessaire de perfectionner l'organisme par le perfectionnement de l'appareil tactile."* Ibid p. VII.

a. Finger pads

If everyone can use their visual and auditive senses without necessarily having to understand how we see or how we hear, the same is not applicable for our sense of touch. To Jaëll, ignoring the organic resources of our tactile system obstructs the physiological refinement of movements. As Jaëll microscopically looked at the finger pads, she discovered unique characteristic distributions: the fact that none of them have a regular pattern, but instead a surface sub-dividable into an infinite variety of small compartments. She accompanies her observation with two figures:

Figure 1 represents an example of papillae, coordinated in papillary lines.





Le Mécanisme du toucher, l'étude du piano par l'analyse expérimentale de la sensibilité tactile. p. 3.

Figure 2 represents what Jaëll and Féré named an "ovoid corpuscle," generally contained in each papilla, where the touch is more delicate and subtle: "A neural fiber approaches the corpuscle, and spirals around it until it ends. The nerve fiber that ends in the skin forms, from its origin in the brain or the spinal cord, a long, delicate, uninterrupted thread."¹¹³

Noticing how the complexity of the papillary layout in the fingers pads is in relation with the cerebral activity, Jaëll reported Féré's main observations regarding the diversification of these dispositions and their consequences on the touch. Féré, who studied fingerprints in the previous years of his research, established that the thumb and second fingers, the most agile fingers, have more diverse papillary organization. Additionally, their morphological variation diminishes from the thumb to the little finger, just like their motion's dexterity declines. Finally, each finger pads have a different region of sensibility.

¹¹³ "Généralement chaque papille contient un petit corpuscule ovoïde; une fibrille nerveuse s'approche de ce corpuscule, l'entoure de quelque tours de spire et s'y perd. La fibre nerveuse qui se termine dans la peau forme jusqu'à son origine dans le cerveau ou la moelle, un filament long, délicat et ininterrompu." Ibid, p. 4.

These differences of sensations have the potential to exercise a great influence on musical execution, since the musical timbre varies depending on the finger pad's region that makes the sound. Jaëll concludes that a touch using the most sensitive region of the pad will allow one to produce the richest and most vibrant sonority.¹¹⁴ From there, a new procedure emerges:

"Verifying pianist's touch through the experimental replication of the touch produced on the keys," in order to prove the strong correlation between the physiological layout of the touch and the musical aesthetic.¹¹⁵

Féré and Jaëll used fingerprints in order to realize an analytical study of the touch, using ink, stamps, and tracing paper to reproduce key surface and key-shaped paperboard to cover the keys that would be fingerprinted during playing. In order to have comparison points, each succession of fingerprints was reproduced at least three times, and after each experience, paperboard covering the keys was replaced.

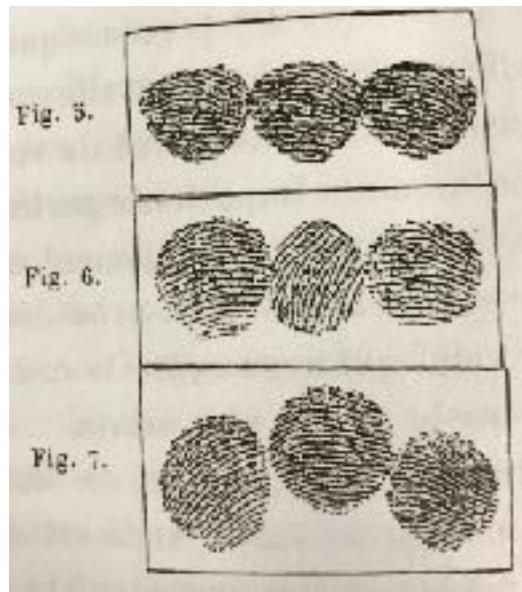
This original and peculiar experience came to fruition for Jaëll and Féré, who established new conclusions after conducting the fingerprints experiment on different pianists. Interestingly, although obviously unique to each individual pianist, fingerprints can vary even for the same pianist. These differences are particularly accentuated for thumbs' fingerprints, *"where the inferiority of tension is marked by a significant loosening of its orientation."*¹¹⁶

¹¹⁴ *"Ces différenciations de la sensibilité exercent une grande influence sur l'exécution, car c'est avec le contact réalisé sur la région la plus sensible que nous obtenons la sonorité la plus forte, la plus vibrante; et le caractère du timbre se modifie selon la région sur laquelle le toucher est réalisé."* Ibid, p. 6.

¹¹⁵ *"Vérifier le toucher du pianiste par la reproduction expérimentale des contacts réalisés sur les touches, est une tentative nouvelle qui met en lumière un fait insoupçonné, la corrélation étroite de l'agencement physiologique des contacts et de l'esthétique musicale."* Ibid, 8.

¹¹⁶ *"Ces différences journalières nous ont surtout frappée dans les empreintes des pouces, où l'infériorité de la tension se marque par un relâchement significatif de l'orientation."* Ibid, p. 55.

Féré and Jaëll asked their students to produce three different attacks, and discovered three results: uniform fingerprints (Fig. 5), incoherent fingerprints (Fig. 6), and graduated and proportionate fingerprints (Fig. 7).



Le Mécanisme du toucher; l'étude du piano par l'analyse expérimentale de la sensibilité tactile. p. 12.

Only the last fingerprints (Figure 7) were the result of a smooth motion and a rich and vibrant sound. Fingerprints from Figure 7 illustrate the correlation between the direction of papillary lines and the sensations they generate. They have been produced by a sliding movement that naturally places the finger in such a way that the direction of the papillary lines correlates the direction of the motion, and allows a remarkable lightness and ease. According to Jaëll, it is the process which takes the least physical effort — but a lot of internal effort — that undeniably helps produce the richest, most vibrant sound.¹¹⁷ To Jaëll, finger pads have thus the potential to create an aesthetic harmony if their physiological unity is coordinated during sound emission.

¹¹⁷ "C'est par celui (le procédé) qui nous coûte le moins d'effort que nous produirons le son le plus vibrant." Ibid, p. 11.

Furthermore, finger pads are formed by remarkably subtle papillary lines that Jaëll metaphorically compare to 'keyboards.' Jaëll states that: *"It is essential to know the keyboard of the instrument in order not play incorrect notes; one can also admit that it is even more important to know the papillary lines which form the keyboards of the finger pads, so as not to arrange their notes in a manner that would break their physiological unity. Because it is by their physiological harmony that they produce an aesthetic harmony."*¹¹⁸ Each finger pad can alter sonority depending on the region that realizes the touch; it is valuable for pianists to learn more about the topography of the finger pads because controlling fingers is only possible if we understand how they work.

b. Fingerprints experiments

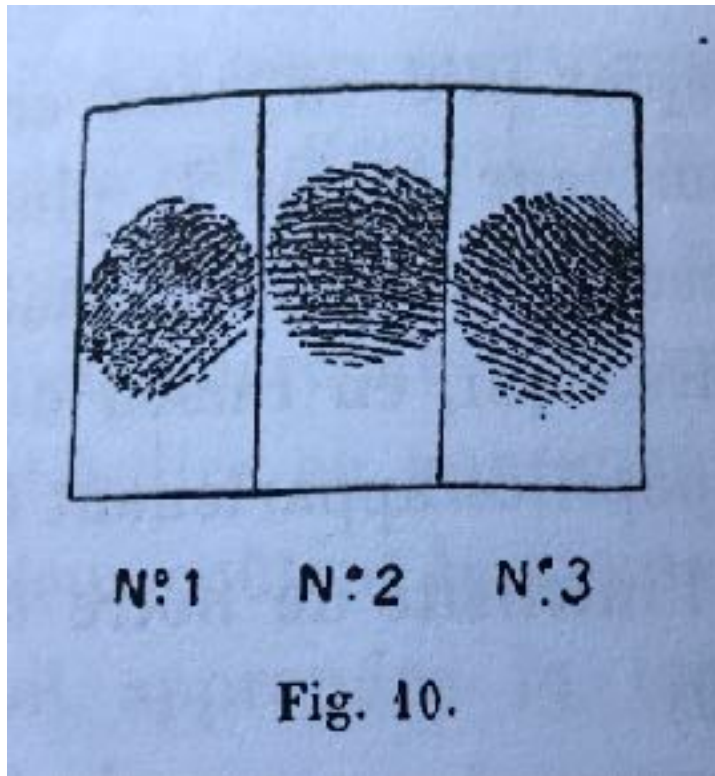
Jaëll often marveled at how the sound produced by a piano varies depending on which region of the finger's pulp is in contact with the key. The three primary regions she distinguished are represented by the following example of fingerprints (Fig.10) of the right hand's second finger.

No. 1 represents the finger pad's left side and has the most vibrant sonority

No. 2 represents the middle region and has a medium sonority

No. 3 represents the right side and has a weaker sonority

¹¹⁸ *"La pulpe du doigt, ainsi analysée, présente une série de claviers d'une merveilleuse subtilité dont nous pouvons apprendre le mécanisme de façon à établir les influences les plus précises sur l'action exercée par ces touches minuscules. Comme chacun le sait, il est indispensable de connaître le clavier de l'instrument afin de ne pas prendre de fausses touches; on peut admettre qu'il est encore bien plus indispensable de connaître les lignes papillaires qui forment les claviers de la pulpe des doigts, afin de ne pas agencer leurs touches de manière à briser leur unité physiologique. Car c'est par leur harmonie physiologique qu'ils produisent l'harmonie esthétique."* Ibid, p. 13.



*Le Mécanisme du toucher,
l'étude du piano par l'analyse
expérimentale de la sensibilité
tactile. p. 16.*

This multi-faced sonority generated by these different contacts gives a taste of the infinite diversification of tactile sensations. Jaëll asserts that for a pianist who has already acquired some practical experience in this matter, this diversification of touch will sound as elementary as the distinction of three primary colors: *"One can, indeed, act on the retina, and evoke by the varied mixtures of these three colors not only the vision of all the colors of the spectrum, but of all the possible nuances. In the same way, it is possible to recognize diversifications of touch and sonority so multiplied by the use of these three contacts, that they seem to evoke the infinite*

beauty of musical harmony in the form of the infinite diversification of tactile sensations."¹¹⁹ In the same manner, these three regions of contact can by themselves create multiple sonorities and give a sense of the musical harmony through the diverse unification of tactile sensations.

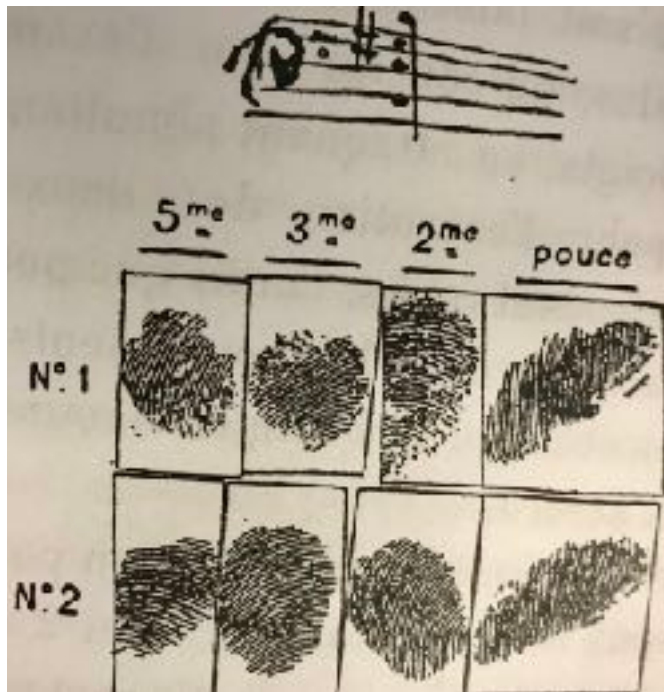
Additionally, finger pads can generate multiple areas of study because their sensitivity influences our movements as well as the visual representation they create in our brain. For instance, to illustrate the relationship between the finger pads' sensibility and the range of movements, Jaëll describes the following experiment: *"If, pressing the tip of the little finger on a polished table, one lightly traces a series of small circular motions, these movements would seem relatively large compared to those that would be traced with one's index finger."*¹²⁰ In our visual representation, circular moves gradually reduce from the little finger to the second finger, a phenomena that Jaëll explains by the fact that our tactile activity is different in every finger.

In *Le Mécanisme du Toucher*, Jaëll consistently illustrates how the extreme sensitivity of the finger pads region is a creative tool with great potential for the musician. But it must be comprehended and refined in order to be used for musical ends. Furthermore, if touch has an influence on the sound, it also acts on the way music is mentally represented, as it aids the musician to conceive the structure of the musical phrase.

¹¹⁹ *"Aux exécutants qui ont acquis à ce sujet quelque expérience pratique, cette diversification des contacts paraîtra aussi élémentaire que si on voulait leur apprendre à distinguer les trois couleurs fondamentales. On peut, en effet, agir sur la rétine, et évoquer par les mélanges variés de ces trois couleurs non seulement la vision de toutes les couleurs du spectre, mais de toutes les nuances possibles. On peut de même arriver à reconnaître des diversifications de toucher et de sonorité si multiples par l'emploi de ces trois contacts, qu'ils semblent évoquer l'infinie beauté de l'harmonie musicale sous la forme de l'infinie diversification des sensations tactiles."* Ibid, p. 18.

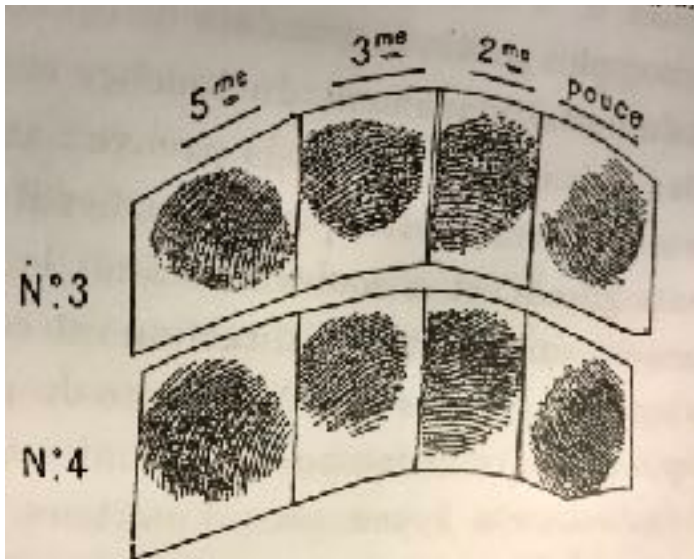
¹²⁰ *"Si, en appuyant l'extrémité du cinquième doigt de la main droite sur une table polie, on trace par le déplacement très léger du doigt une série de mouvements circulaires de petite dimension, ces mouvements paraîtront relativement grands, comparés à ceux qu'on tracerait avec l'index. Les dimensions des mouvements circulaires se réduiraient en effet graduellement du cinquième à l'index. Ce phénomène provient de ce que notre activité tactile est différente dans les différents doigts."* Ibid, p. 19.

Later, Jaëll analyzes two different performers' fingerprints to show how a disrupted succession of contacts can generate a poor sonority. The difference between the two fingerprints' series is striking. Two different performers were asked to play the same chord twice using the thumb, second finger, third finger and little finger of their left hand. The sequence below represents fingerprints resulting from two chords played with a poor sonority. They are disparate and completely uncoordinated.



Le Mécanisme du toucher, l'étude du piano par l'analyse expérimentale de la sensibilité tactile. p. 53.

Whereas the sequence below represents fingerprints resulting from the two same chords played with a good sonority. Fingerprints are in correlation to each other, and it would be impossible to remove one of the four fingerprints from the sequence without altering their coherence.

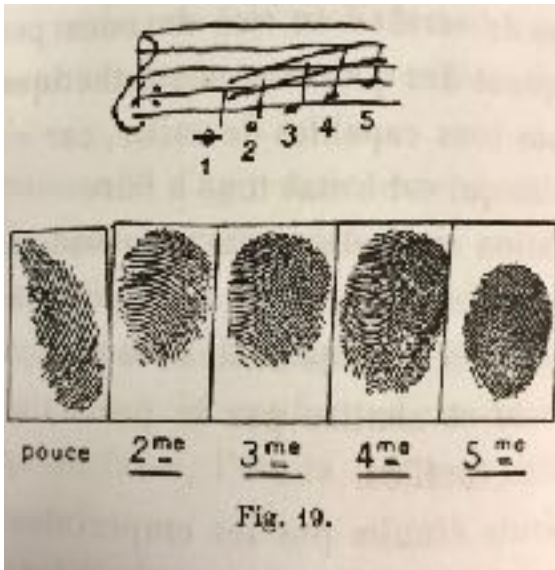


Le Mécanisme du toucher; l'étude du piano par l'analyse expérimentale de la sensibilité tactile. p. 53.

Looking at the dimension of the fingerprints, one might assume that No. 1 and No. 2 have been made by a smaller hand. In reality, fingerprints No. 3 and No. 4 were the result of the same chord played by a smaller hand. Jaëll never reveals the identity of the subjects who helped with the experiments, but she asserts that the size and harmony of the second series of fingerprints have been made by a performer whose touch has been perfected. When simultaneously playing four keys at the same time, this pianist made sliding motions that increased the key's surface by a third, and lifted the hand making a curved movement. The orientation of this movement was to *"conform to the direction of the thumb's papillary lines."*¹²¹

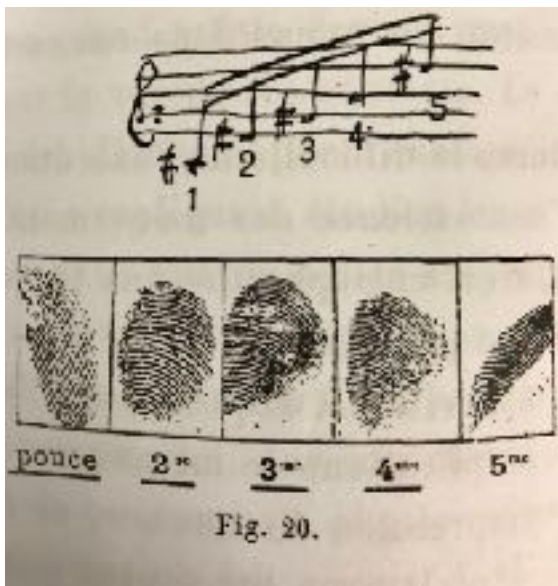
With the understanding that fingerprints can help solve complicated executions without altering the beauty of the sound, Jaëll then studies fingerprints made by the same performer during different parts. The results unsurprisingly show that simple successions of notes generate regular and coordinated fingerprints, as shown in fig. 19.

¹²¹ *"Au moment d'attaquer simultanément les quatre touches, il a fait des mouvements glissés, et a soulevé aussitôt la main par un mouvement courbe dont la direction est conforme à celle des lignes papillaires de l'empreinte du pouce. Ces glissés, quoique faits instantanément, ont augmenté la surface des contacts à peu près d'un tiers."* Ibid, p. 54.



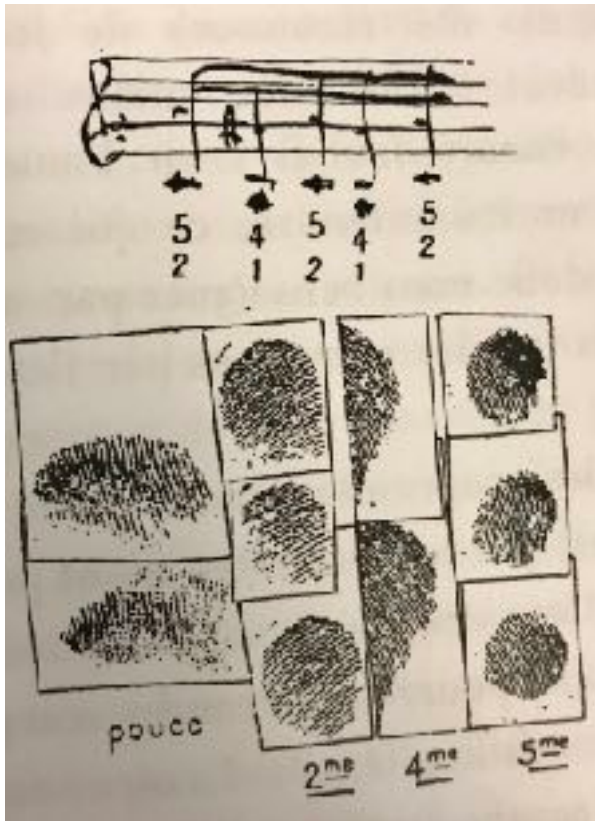
Le Mécanisme du toucher; l'étude du piano par l'analyse expérimentale de la sensibilité tactile. p. 58.

But if the intervals are more complex and angular, fingerprints lose the clearness of their contours, as shown in fig. 20.



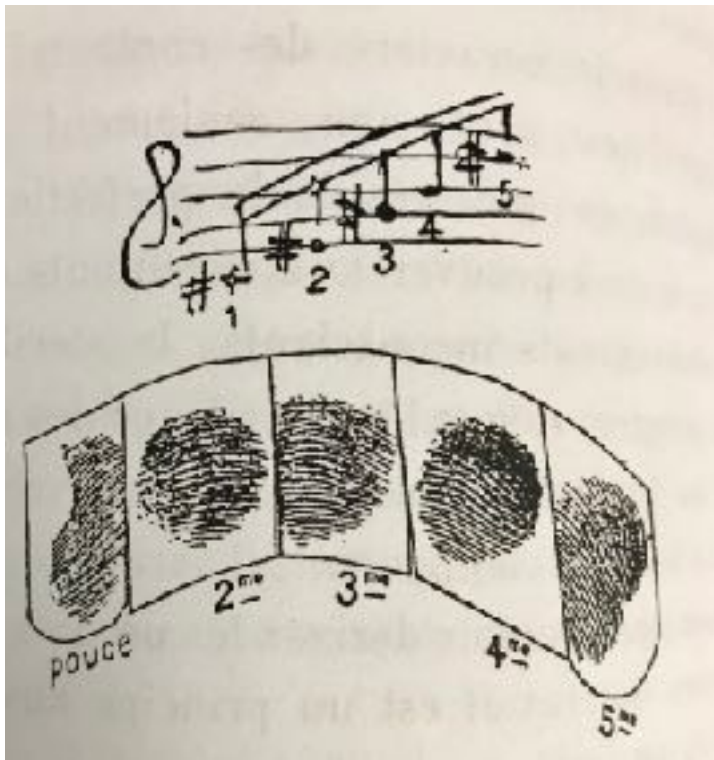
Le Mécanisme du toucher; l'étude du piano par l'analyse expérimentale de la sensibilité tactile. p. 58.

Or when playing successions of simultaneous notes, the fingerprints' contact zone becomes more superficial and they form even more irregular shapes, as shown below:

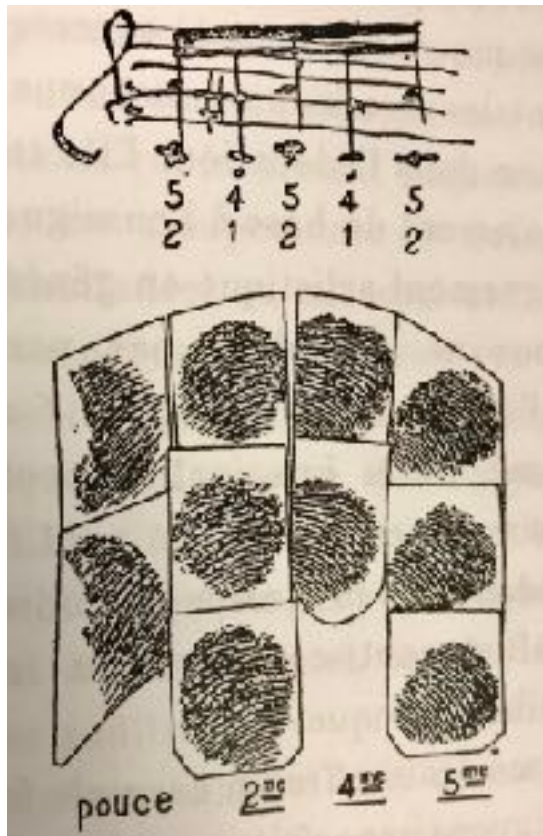


Le Mécanisme du toucher, l'étude du piano par l'analyse expérimentale de la sensibilité tactile. p. 59.

By comparison, the following figures represent fingerprints playing the same intervals, after having corrected the tactile sensations and finger pads locations:



Le Mécanisme du toucher, l'étude du piano par l'analyse expérimentale de la sensibilité tactile. pp. 62-63.



As Jaëll notes, some performers believe they can master a technically difficult piece so long as they are able to play all the notes at a fast tempo. But she asserts that *"an analysis of the fingerprints of these optimistic performers will prove that the difficulty cannot be conquered just by doing, in a determined timeframe, the required amount of stroke movements."*¹²² Jaëll further identifies the flaw that affects so many pianists: the lack of development of the sense of hearing.

Tactile mistakes should be easy to hear, but the habits created by a poor use of practice time act like a sonic barrier that prevents the performers from hearing what they truly sound like. Fingerprints were for Jaëll intuitive illustrations of the tactile impairments that the pianist was unable to hear, and provide a more accurate feedback to divulge the nature of movements executed. Disordered fingerprints are a sign of a disorganized or unconscious emission of the touch, a sign that our conception of the sound is altered by our senses. Like a deformed mirror, this misguided mental representation will only convey disoriented sonorities. In this way, pianists can only overcome challenges associated with the rendition of a piece once the shape of their fingerprints cease distorting as the difficulty of the music increases.

The conclusions of Jaëll and Féré's fingerprints experiments are simple and precise: if the fingerprints are coordinated — in other words, if the papillary lines present a continuous arrangement — the touch is harmonious. Consequently, disorganized series of fingerprints without any organic continuity will reflect a bad sonority. Even though it may seem intuitively easier to train the ear before training the finger, the fact remains that excessive repetitions and a poor use of tactile sensations profoundly affect the quality of our listening. Mechanical and

¹²² *"À ces exécutants optimistes, l'analyse de leurs empreintes prouvera que la difficulté n'est pas vaincue parce qu'on arrive à faire, en un temps déterminé, la quantité de mouvements d'attaque exigés."* Ibid, p. 59.

unconscious hours of practice may even make pianists believe that they sound different than they actually do.

Jaëll's work paves the way for the development of refined tactile and auditive sensations. Indeed, depending on the finger pressure and the finger pad's region pressing the key, musical timbres vary through increasingly delicate gradations. Like a color palette, this diversity constantly serves the expressivity and depth of a piano playing. Jaëll, who conducted these fingerprints experiments for over a year, affirms how every time she and Dr. Féré noticed a striking enhancement regarding a pianist's sonority, it always corresponded with an improvement of fingerprints' contacts.¹²³

Jaëll found that the localization of finger pad's contacts on the keys also helped to improve fingers' dexterity for the execution of difficult intervals, and to minimize a waste of motor activity. As Jaëll noted: *"When we attentively observe movements performed by the fingers of some pianists, it is striking to note that they could play the same piece several times with the number of movements they need to play it once."*¹²⁴ The development of finger pads sensitivity and localization on the keys should be then used as a basis in pianists' education, since it affects the sound, motor activity, and finger dexterity in a musical way.

¹²³ *"Chaque fois que nous avons été frappé par l'amélioration de la sonorité dans l'exécution d'une oeuvre, nous avons constaté par l'analyse des empreintes qu'elle correspondait à une amélioration des contacts."* Ibid, p. 143.

¹²⁴ *"Lorsqu'on observe attentivement les mouvements faits par les doigts de certains exécutants, on est frappé du fait qu'ils pourraient jouer plusieurs fois le même morceau avec la quantité de mouvements qu'ils font pour le jouer une seule fois."* Ibid, p. 121.

2. Intelligence and Rhythm in Artistic Movements

In 1904, Jaëll presented an updated collection of her research and her discoveries on the science of the touch in *L'Intelligence et le Rythme dans les Mouvements Artistiques* ("*Intelligence and Rhythm in Artistic Movements*").¹²⁵ This book sought at first to highlight the importance of cerebral activity in physical artistic movements. In this context, the definition of movement is a means to an end whose purpose is to guide artistic thinking; such as a perspective line in visual arts or a musical gesture gives meaning to a musical phrase. Finding its origin spatially, an artistic movement guides the thought and can be divided into several elements: acceleration, slow motion, immobility, all of which have a fundamental purpose in the musical rhythm. While the first part of *L'Intelligence et le Rythme dans les Mouvements Artistiques* focuses on the mental and physiological functions that brings artistic movements and rhythm to life, Jaëll explores in the second and last part properties of the musical touch and the hand.

a. The Thinking Mechanism

(1) Mental effort

If it is necessary to avoid performing musical gestures without thinking, it is even more important to learn how to think about them. Yet again, Jaëll condemns the "*reiterated repetitions*" that are prescribed in many teaching styles, since they "*fatally develop fingers*

¹²⁵ Jaëll, Marie. *L'Intelligence et le Rythme dans les mouvements artistiques*. Paris: Alcan, 1904.

mechanism at the expense of thought process."¹²⁶ This repetition generates an automatic and inaccurate muscle memory that obstructs cognitive development. Jaëll designates "*a distant anti-scientific era*" as being responsible for such a counterproductive mechanization of the memory, because "*the refinement of functional activity and sensorial perceptions was not yet considered as a phenomena correlated to the development of intelligence.*"¹²⁷ As in her previous works, Jaëll strongly criticizes the lack of interdisciplinary interest in the artistic world.

Regardless of skill level, "*the initial principle of study remains the same; it consists of learning how to think through the hands, to think through the calculation of differentiated sensations that can be caused by means of attitudes and movements.*"¹²⁸ But only a significant mental effort can govern physiological perfectionism. And correlated to a superior state of conscience, every refinement of a manual mechanism echoes a similar refinement of a mental mechanism. In other words, the perception must be consciously developed in both in the hand and the mind. Thus, a decentralization of the thinking needs to happen, because "*there is a parcel*

¹²⁶ "*Le mouvement lui-même, aussi bien que le mot, peut être stérilisé, on pourrait dire profané par sa répétition réitérée que l'on impose dans l'enseignement des instruments de musique. Là, durant de longues heures, on développe fatalement le mécanisme des doigts au détriment du mécanisme de la pensée, de la même façon que la mémoire automatique des mots imposée dans les études scolaires.*" Jaëll, Marie. *L'Intelligence et le Rythme dans les mouvements artistiques*. Paris: Alcan, 1904. p. 2.

¹²⁷ "*Cette mécanisation nuisible de la mémoire des mouvements et de la mémoire des mots semble tirer son origine d'une époque anti scientifique lointaine, où l'affinement progressif de l'activité fonctionnelle et des perceptions sensorielles n'était pas encore considéré comme un phénomène corrélatif du développement de l'intelligence.*" Ibid, p. 3.

¹²⁸ "*Quel que soit le degré de perfectionnement, le principe initial de l'étude reste le même; il consiste à apprendre à penser par la main, à penser par le calcul des sensations différenciées qu'on s'applique à provoquer au moyen des attitudes et des mouvements.*" Ibid, p. 5.

of thought everywhere there is sensation; learning how to feel through the hand is learning how to think."¹²⁹

Therefore, the first effort of education consists in learning *"how to feel our hand, whose destination is so superior to that to which our unconsciousness reduces it."*¹³⁰ But once again, a state of physiological unconsciousness prevents us from moving our fingers independently from each other. When fingers feel limited physically, incapable of functioning well or struggling to render and express a work, it is because of our ignorance and inability to think through them. Every finger's motion is in reality ahead of the thought: *"Before we even have a precise idea of the movement we need to do, this movement has already started; this advance is all the greater as the manual sensations are less developed."*¹³¹

(2) Mental sensations

Jaëll designates two principal groups of sensations in a musical gesture: the sensations of movements' activity and the sensations of movements' cessation. Immobility is as valuable as action, since every finger necessitates a prior effort of cessation of movement in order to connect the movement to the cerebral commandment. Muscles' static tension should not be considered as

¹²⁹ *"Il s'agit, en forme, de former une espèce de décentralisation de la pensée; au lieu de croire que la pensée est dans la tête, on croira qu'elle est dans la main et dans la tête. C'est déjà un progrès puisque, à vrai dire, il y a une parcelle de pensée partout où il y a sensation; apprendre à mieux sentir par sa main, c'est apprendre à mieux penser."* Ibid, p. 5.

¹³⁰ *"Le premier effort de l'éducation consiste donc à apprendre à sentir notre main, dont la destination est si supérieure à celle à laquelle notre inconscience la réduit."* Ibid, p. 6.

¹³¹ *"Avant que nous ayons l'idée précise d'un mouvement à faire, ce mouvement est déjà commencé; cette avance est d'autant plus considérable que les sensations manuelles sont moins développées."* Ibid, p. 7.

a "resting force"¹³² in artistic education because they provide the initial effort on which depends the accuracy of the musical gesture.

Afterwards, Jaëll states that the attack of the sound needs to be emitted by one single circular motion that makes the actions of pressing, holding and lifting the key three continuous phases rather than three distinct actions. Jaëll explains that in traditional piano playing, fingers stay still while holding the key down, and warns how *"this cessation of finger movement impedes the development of musical memory because it stops the movement of thinking."*¹³³ A vertical and disembodied motion creates an uniform mechanization that interrupts the flow of the motion and the thinking: *"These characteristics stops of mental functions indicate that the mechanism of thought is constrained by the mechanization which one tries to communicate to the movement. On the contrary, as soon as a movement is directed towards a goal, at a lightly accelerated pace, it identifies itself with the musical thought. It circulates freely, as movement and thought seems to complete themselves. . . . Little by little, the thought becomes the body of which the motion is the shadow."*¹³⁴

In order to remain under the constant control of the thinking, touch must thus be transformed into a continuous sliding motion. It allows one to consciously follow the flow of the movement and to regulate it during the emission of the sound, like a bow for a string instrument.

¹³² "La tension statique des muscles, loin de pouvoir être considérée dans l'éducation artistique comme une force au repos, fournit précisément l'effort initial qui rend cette éducation possible." Ibid, p. 7.

¹³³ "Il faut dire que dans l'étude habituelle du piano où le doigt est maintenu immobile pendant qu'il tient la touche enfoncée, cet arrêt du mouvement du doigt entrave le développement de la mémoire musicale, parce qu'il arrête le mouvement de la pensée." Ibid, p. 9.

¹³⁴ "Ces arrêts caractéristiques des fonctions mentales indiquent que le mécanisme de la pensée est entravé par la mécanisation qu'on cherche à communiquer au mouvement. Au contraire, dès qu'on mouvement semble se diriger vers un but par une allure légèrement accélérée, la pensée s'identifie avec lui; elle circule librement, le mouvement et la pensée semblent se compléter. . . . La pensée semble devenir peu à peu le corps dont le mouvement n'est que l'ombre." Ibid, p. 21.

This sliding motion actively follows the duration of the sound and the contours of the music, and helps to refine sensations such as the arm weight: for instance, the arm can develop the sensation of being maintained in the air thanks to an opposite force. Part of the weight will be channeled, making the sound vibrant and all motions effortless. Freed from unnecessary efforts, hands can then be in phase with the musical flow, a natural flow that has to be constantly maintained by the thinking mechanism.

(3) Spatiality

The mechanism of the thinking must also be conducted spatially in addition to temporally. It is indeed harder to admit that a musical work takes place in a space frame, since music is physically intangible. But as Jaëll states, spatiality is so inseparably linked to auditive faculties that one may be tempted to believe that sounds, *"under the action of unknown influences, are compressible and expandable."*¹³⁵ Recalling a capella choirs from the Basel Cathedral years ago, Jaëll observes that wherever she has the chance to hear beautiful music, she has the impression that the space around her *"polyphonically vibrates,"* and this impression is enhanced by a *"vague visual representation of vibrations"* that she thinks she sees because she knows they exist.¹³⁶

¹³⁵ "On admet en principe qu'une oeuvre musicale se déroule dans le temps, mais ne peut pas se dérouler dans l'espace; et cependant l'idée de l'espace est si inséparablement liée à mes facultés auditives que je serais tenté de croire que les sons, sous l'action d'influences inconnues, sont compressibles et dilatables." Ibid, p. 11.

¹³⁶ "Je me souviendrai toujours des chœurs a capella que j'ai entendu chanter dans la cathédrale de Bâle par des écoliers de choix, il y a nombre d'années. Comment concevoir cette pureté extraordinaire du timbre des voix, ce fondu merveilleux des nuances, sans ces voûtes et ces dimensions de l'édifice, sans cette masse d'auditeurs s'ajoutant à cette masse de pierres des murailles? Du reste, n'importe où je me trouve, quand j'entends de la belle musique, j'ai l'impression que l'espace dans lequel je suis placée vibre polyphoniquement, et à cette impression se joint une vague représentation visuelle de vibrations que je crois voir, parce que je sais qu'elles existent." Ibid p. 11.

Transposing this thought to the piano, the perceptions' sphere of action is, in reality a keyboard divided into a three-dimensional space. While piano strings length vary, the physical keys retain the same dimension. Hence, a pianist's thought is usually adapting to the musical intervals' gap and communicates to their fingers the particular distance to which they need to adjust. But aside from interval width, height must also be taken into consideration. The full and spatially delimited three-dimensional mental scope of action seen and described by Jaëll extends over a surface of about 113 centimeters (3 feet and 7 inches) in width, 15 cm (5.9 inches) lengthwise and 30 cm (11.8 inches) to 40 cm (15.7 inches) in height.¹³⁷

Thus, the dimension of movements initiated above the keyboard by the arms has to be conceived in three different directions. Well before the development of computers generating three-dimensional reconstructions, Jaëll demonstrates once again her remarkable avant-garde spirit by indicating that pianists should mentally fuse the division of time and space and proceed with their musical execution as if the keyboard was made divisible by a cubic grid with tiny divisions.¹³⁸ Yet again, she criticizes the negligence of piano teaching that fails to consider height and length; in doing so, these students face an absence of consciousness and mental phenomena. Jaëll also adds how *"the controlled motion that permits the establishment of the most intimate fusion between the division of space and time should not only serve as a basis for piano teaching,*

¹³⁷ "La totalité de ce champ d'action mental, délimité dans l'espace, s'étend à peu près à 113 centimètres pour la largeur du clavier, sur 15 centimètres pour la longueur des touches, et à 30 à 40 centimètres en hauteur pour l'espace supplémentaire." Ibid, p. 13.

¹³⁸ "C'est donc à trois directions différentes que le calcul des mouvements doit s'opérer comme si le clavier, aussi bien que l'espace supplémentaire en hauteur, était rendu divisible en un quadrillé cubique à divisions minuscules servant de trame à la marche de la pensée." Ibid, p. 13.

but for all musical instruments."¹³⁹ Furthermore, there are no limits to the enhancement of sensations and movements: the thought can indeed divide the space through narrower and clearer grid patterns in such a way that it indefinitely refines the sensation of space. Reversely, the quality of gestures becomes more and more refined thanks to the increasing subtlety of the sensations they generate.

(4) Children's aptitudes

As Jaëll repeatedly argues, anyone capable of an effort of will is capable of developing a thinking mechanism that unifies functional refinement with the musical flow. Jaëll notes how children's special aptitude for movement coordination ensures them a superiority to adults, one which needs to be appreciated at fair value by educators. Most of the time, adults are trying to communicate their personal knowledge to their younger students instead of helping them to use their own resources and show them how to create their own personal knowledge. But children have the potential and willingness to exercise direct actions on their organs. And one of the keys in children's musical education is to show them their own resources and provoke the thinking elements in their brains to learn how to think. Jaëll claims that: *"It is by teaching to a child how to know himself that one helps him discover everything outside of him."*¹⁴⁰

¹³⁹ *"Le mouvement contrôlé qui permet d'établir la fusion la plus intime entre la division de l'espace et celle du temps devrait non seulement servir de base à l'enseignement du piano, mais aussi à l'enseignement de tous les instruments de musique."* Ibid, p. 14.

¹⁴⁰ *"C'est en apprenant à l'enfant à se connaître lui-même qu'on doit lui faire connaître tout ce qui est en dehors de lui."* Ibid, p. 16.

It is in a child's hand that sensations of motion and immobility are located in the most diverse way.¹⁴¹ At the beginning of her piano training, a child will have the impression that keys are heavy for her hands, and this mental barrier will result in clumsier motions. But as soon as she realizes she can move a finger while ceasing the movements of other fingers, a new state of awareness flourishes in the mind, and she starts simultaneously processing the mobility and immobility of the fingers. Using her own resources through the perfectibility of her manual and mental resources helps develop a personal knowledge and simplifies her actions.

On the other hand, adults will have a much harder time using their own physiological means. To Jaëll, no matter how hard an educator will try to help an adult, internal resources will be impossible to acquire without a considerable and prolonged effort. Indeed, adults' functional refinement of the hand is very much impeded by adaptations to daily life, where movements are subject to rough movements. Under the influence of the habits acquired, their hand looks more like a *"clamp formed by five branches capable of varied positions and movements, such as nature has created the hand."*¹⁴²

¹⁴¹ "Sa volonté exerce une action plus immédiate sur ses organes, car c'est précisément dans la main de l'enfant que l'arrêt et le mouvement se localisent, avec une facilité surprenante, de la manière la plus variée." Ibid, p. 15.

¹⁴² "À l'adulte, au contraire, on a beau indiquer ces mêmes moyens; sans un effort considérable et prolongé, ils sont hors de portée. Chez lui, l'affinement fonctionnel que la main est susceptible d'acquérir a été entravé en partie par les adaptations journalières dans lesquelles les attitudes et les mouvements ne subissent que des différences grossières. Sous l'influence de ces habitudes acquises, sa main ressemble plus à une pince à cinq branches capable de positions et de mouvements divers, tels que la nature a constitué la main." Ibid, p. 15.

b. The Musical Touch

(1) Tuning the hand

In that respect, the hand has functional properties that are remarkably innate. This physiological compass is misused by an ensemble of factors that could be summarized by a lack of physiological and musical conscience. But the nature of the keyboard and the uniform dimensions of its keys can also sometimes create inadequacies in the hands. Just as it is necessary to tune a violin, for instance, in perfect fifths, it is necessary for pianists to tune their ten fingers to the musical intervals contained in the music. In this line of thought, Jaëll observes that *"all hands could be considered as harmonious because there is an analogy between the intervals of which the musical system is composed and the structure of the hand."*¹⁴³ Just as musical intervals are characterized by different vibrations, *"the attitude of fingers, in the execution of intervals, correspond to combinations of sensations in which remains a harmony of numbers, yet unknown, that we perceive as equivalent to the musical harmony it can generate."*¹⁴⁴ Mathematical principles of sound and elaboration of ratios have been a subject of interest since Plato, and it is likely that a person as knowledgeable and curious as Jaëll was aware of acoustic laws. But the focus here is a physiological one. It is the development of a conscious unity of sensations that will tune the hands to the music and its harmonic laws in the three-

¹⁴³ *"Nous disons que toutes les mains pourraient être considérées comme harmonieuses, parce qu'il y a une analogie entre les intervalles dont se compose le système musical et la structure de la main."* Ibid, p. 34.

¹⁴⁴ *"Car de même que les intervalles musicaux correspondent aux modifications du nombre de vibrations, de même les attitudes des doigts dans l'exécution des intervalles correspondent à des combinaisons de sensations dans lesquelles subsiste une harmonie de nombres qui nous est inconnue, mais que nous percevons comme équivalente à l'harmonie musicale qu'elle peut faire naître."* Ibid, pp. 34-35.

dimensional space above the keyboard. In other words, an acoustic and mathematical erudition, as invaluable as it would be for a musician, cannot be enough to make music in the proper sense of the term, without a full understanding of the sensations harmonizing the hand's mechanism. Taking the measure of a third, a fifth, an octave or any other interval provokes transversal sensations in the hand that are linked to auditive sensations. Fingers are linked to one another, like elastic threads, creating a geometry of sensations.

(2) Geometry of sensations

These sensations must be perceived in three directions: width, height, and depth. In width, it is necessary to develop sensations exchanges on how the fifth finger reacts to the thumb, and vice versa. Jaëll remarks that these transversal sensations must exist, but to a lesser degree, between every other finger. As pianists manage to reinforce sensations allowing them to have a clear representation of the width of their hand, *"their attitude and motions become freer and more nuanced."*¹⁴⁵ The representation of length sensations are mostly located in the second finger, in the form of an extension completed by graduated sensations of shortening provoked by the other fingers.

Height and depth sensations are far more complex. They require the use of previously developed sensations of width and length in order to construct below the hand an arch that finds its stability oriented by the sensations of height and depth. It allows regulation of the depth

¹⁴⁵ *"Ces sensations transversales doivent exister, mais à un degré moindre, entre les attitudes de tous les doigts, car c'est à mesure que le pianiste arrive à renforcer les sensations par lesquelles il se représente la largeur de sa main que ses attitudes et ses mouvements deviennent plus libres et se pondèrent davantage."* Ibid, p. 38.

characteristic of the palm while maintaining a constant balance with the other metacarpals. Jaëll concludes that: *"Through this intensity of divergent sensations [] a pianist can manage to establish the harmony of sensations that correspond to musical harmony."*¹⁴⁶ Once again, it is the refinement of physiological sensations that allows more command at the piano, not confined by arbitrary repetitions of challenging musical fragments. Once the hand is dissociated and sensitized, it vibrates as it makes contact with the three-dimensional space above the keyboard.

(3) Cerebral motions and physiological elasticity

One of the cerebral actions needed on the piano is one that regulates the weight of motions. For two reasons, pianists must develop the sensation to extract the sound from the piano rather than producing it through the weight of uncontrolled finger pressures:

1. A musical reason: uncontrolled weight has a negative effect on the sound.
2. A physiological reason: if one presses the key at a maximum speed without mentally shaping the movement, the finger pressure transmits to the key an unbalanced weight. The energy of this motion only serves to depress the key vertically and is wasted for the next movement, as there is no rebound. This process is contrary to the principle of elasticity inherent to the muscular system. But if one simultaneously creates an upwards attraction while pressing the key, the movement will become elastic, easy moving and active, and the mechanism of the hand will be attuned to the mechanism of the piano.

¹⁴⁶ *"En ce qui concerne la location du toucher, c'est par cette intensité de sensations divergentes que le pianiste peut arriver à établir dans ses attitudes l'harmonie des sensations qui correspond à l'harmonie musicale."* Ibid, p. 40.

Elasticity is a fundamental condition in piano playing, but it requires a constant participation of consciousness, so as to never render a movement uniform. Because an uniform movement is only processed through intermittence and cannot be celebrated: *"Thought only circulates freely in a movement when the pace of this movement is in constant transformation, and, somehow, all transformations inherent to the properties of artistic motions can be reduced to one unique transformation: that of speed, because this transformation is rhythm and thought. It is only through their cerebration that movements can identify themselves to the aesthetic laws of the musical art; their rhythm are maintained, like those of music, in a state of constant transformation."*¹⁴⁷

In resonance with its Greek etymology, *rhuthmos*, ῥυθμός, to flow, rhythm creates a constant flux that influences the expression of the movement. The rhythmic activity transmitted by the fingers pressures awakens the cerebral activity of the pianist. Guided by numerous sensations, pianists should feel that their thinking is much more active than their fingers, and should by no means rely on finger's automaticity. If the mechanism becomes uniform, dynamic rhythmic relations will be suspended and one will become overly dependent on measure divisions.

¹⁴⁷ *"La pensée ne circule librement dans un mouvement que lorsque la vitesse de ce mouvement est en constante transformation et, en somme, toutes les transformations inhérentes aux propriétés des mouvements artistiques pourraient se ramener à une transformation unique: celle de la vitesse, car cette transformation, c'est le rythme, c'est la pensée. C'est seulement par leur cérébralisation que les mouvements s'identifient avec les lois esthétiques de l'art musical; leurs rythmes se maintiennent, comme ceux de la musique, en état de transformation constante."* Ibid, p. 48.

(4) Spheric touch and contrary touch

The *Revue Philosophique de la France et de l'Étranger* published a review on *L'intelligence et le Rythme dans les mouvements artistiques* that notes the originality and peculiarity of Jaëll's experiences. After summarizing the beginning of the book, L. Arréat eschews paraphrasing and instead refers the reader to the text of Jaëll's book itself for the second and especially final part, on spheric and contrary touch, because these pages are "hard to summarize." Arréat criticized Jaëll for excessively estimating the general educative value of a new method. He also recommended that her experiences be instituted in special laboratories.¹⁴⁸ This comment must have been generated by the last part of *Intelligence and Rhythm in Artistic Movements*, which is far more complex than the previous content, and where Jaëll intended on sharing new findings on her research.

Here, Jaëll once again demonstrated her originality by employing an unexpected teaching aid in her experimental methods: marbles. Indeed, the touch of one finger can create a simultaneous mental representation of the four different orientations, an effect only made possible if the object touched is spheric.¹⁴⁹ Jaëll thus described experiments showing how the spheric touch transforms dimensions proportionally. First, if a finger covers a marble and presses it from the median region of its finger pad with back and forth motions, the mental

¹⁴⁸ "Peut-être Mme J. estime-t-elle aussi avec quelque excès la valeur éducative générale d'une méthode nouvelle. Quant aux faits mêmes, il conviendra que des recherches soient instituées dans les laboratoires spéciaux en vue de les contrôler." Arréat, L. (1905). *L'intelligence et le rythme dans les mouvements artistiques* (Book Review). *Revue Philosophique De La France Et De L'Étranger*, 59, 537-539.

¹⁴⁹ "Rappelons d'abord que le toucher d'un seul doigt peut correspondre à la représentation mentale simultanée des quatre orientations différentes que comporte un objet déplaçable à volonté, et que cet effet n'est obtenu que si l'objet touché est sphérique." Jaëll, Marie. *L'Intelligence et le Rythme dans les mouvements artistiques*. Paris: Alcan, 1904. p. 105.

representations of dimensions will vary considerably depending on the sensibility of the person. They will be either over-estimated, under-estimated, or perfectly estimated, depending on the level of refinement.

Jaëll keenly observed that mental dimensions also vary depending on the combination of fingers used. She grouped together unities of three fingers, using different marbles. In one unity, the index and third finger of the right hand will proportionally generate small dimensions, while the dimensions in the left hand index will increase. In another unity, the right hand index will be combined with the fourth finger in the right hand, and the left hand index. The dimensions perceived by both indices will decrease while the fourth finger's dimensions will considerable increase. One may argue that the mental representation of the fourth finger's dimension increases because it is by nature the weak finger. But the hand's network is far more complex than our intuition would suggest. Indeed, if the right hand's fourth finger is paired with the right hand's third finger, only the dimensions of the left hand's index will decrease, while both third and fourth finger will proportionally have higher dimensions. Jaëll adds: *"Through this substitution, the left hand is changed, so to speak, to the right hand, because its index will be so small that it almost corresponds to those of the initial touch of the right index finger."*¹⁵⁰ Jaëll continues, using four marbles, then changing the size of the marbles, and experimenting with cold then warm fingers.

But where is the analogy with the musical touch? If spheric touch is far simpler compared to the musical touch, where rhythmic orientations create even more complex combinations, it is

¹⁵⁰ *"Par cette substitution, la main gauche est changée pour ainsi dire en main droite, car son index prendra des dimensions si amoindries qu'elles correspondent presque alors à celles du toucher initial de l'index droit."* Ibid, p. 110.

much more suggestive than a flat surface such as a keyboard. To awaken mental representations and stimulate the tactile sense, fingers must roll on the keys when they are pressing them. Just like the marble presses into the finger pads, the fingers must permeate with the keys and *"their sphericity must leave a trace during this rolling, as light as it might be. We would not play the piano if our finger pads were square-shaped."*¹⁵¹

Finally, Jaëll observed how the adjustment of both hands is better suited to string instruments than keyboard. While hands' dorsal sides are oriented in opposite ways for violinists and violists, they remain oriented upwards in piano playing, creating unnatural physiological relations. In fact, this result usually generates the impression of having a skillful and a clumsy hand. Jaëll rectifies this erroneous perception: *"We do not have a dexterous hand and a clumsy hand, but a hand that is adapted to what we want it to do and a hand that is not."*¹⁵² The hand that *"does not know"* is a complementary hand, and its opposite nature towards the other hand requires us to think into two different orientations, though this also is a faculty that can be refined.

To Jaëll, the existence of a complementary hand necessarily implies the existence of a contrary touch, which she demonstrates through an experiment using mirror writing. If both hands have a well-developed tactile sensibility, then they can combine their functions and attitudes in such a way that, if one hand writes a word, the complementary hand can mirror it. The right hand will write from left to right while the left hand will write from right to left.

¹⁵¹ *"Les doigts roulent sur les touches au moment de les enfoncer, et leur sphéricité doit laisser des traces dans ce roulement aussi faible qu'il soit. Nous ne jouerions pas du piano si nos pulpes étaient carrées."* Ibid, p. 121.

¹⁵² *"Par rapport aux attitudes des doigts, nous n'avons donc pas une main adroite et une main maladroite, mais une main adaptée à ce qu'on veut lui faire faire et une main qui ne l'est pas."* Ibid, p. 145.

Obviously, the quality of writing won't be as refined for the complementary hand, but the word will be legible. Jaëll noticed a new visual property thanks to these reverse tactile sensations: as she was writing in mirror, she realized that not only she was able to read both writings with equal ease, as if they were equally familiar, but seen from right to left or left to right, she was able to recognize them as one single writing. Even though the images were not identical, the senses directing her manual action of writing were combining to form a logical unit.

These demonstrations of the mechanism of the tactile sensibility permit us a glimpse of the extraordinary versatility of cerebral phenomena. Much like a visual artist who will have the impression that a touch of color or a line will radically change the physiognomy of his painting, a musician will, through his tactile sensibility, perceive the tiniest change of movement through his touch.

Jaëll cautioned that the ideas she expressed in *L'intelligence et le Rythme dans les Mouvements Artistiques* still required additional exploration to ensure their scientific validity. She was only able to touch, feel, and see differently after she was able to feel her two hands differently. In a sense, she was entering a different physiological internal world, through which the musical external world was appearing as completely different. As the perception of her musical touch changed, her other perceptions also evolved. Essentially, if musical thinking is located in the fingertips, then musical touch depends on how we think, how we hear and see through our hands and conduct movements in relationship to the keyboard's three-dimensional space.

3. Rhythms of the Gaze and the Dissociation of Fingers

Continuously looking for increasingly refined ways to develop the sensitivity of the hand and perceptions in general, in 1906 Jaëll published a fourth major writing, *Les Rythmes du regard et la Dissociation des doigts* ("*Rhythms of the Gaze and the Dissociation of Fingers*").¹⁵³ As the title indicates, it covers the topic of rhythm in general, in art, in nature, and in its broader meaning: how visual rhythms have an influence on our perception of the world and on the mechanisms of our thinking. Indeed, as our eyes move through different geometric figures with variable shape patterns, Jaëll notices they are either disrupted by or driven in their rhythmic pace, depending on the character of the figures. Drawing on this, she creates a series of visual experiments with different figures destined to understand and refine her understanding of the visual sensations in relation to the hearing and tactile sensations.

Jaëll's capacity to establish subtle correlations between tactile, auditive, and visual perceptions using her experience as a pianist as a starting point was acknowledged by her philosopher friend Edouard Schuré, who remarked that *Rhythms of the Gaze and the Dissociation of Fingers* is "*quite difficult for the majority of readers, but extremely suggestive for those who like to reflect on the foundation of things.*"¹⁵⁴ In this particular context, "gaze" refers to the constant and conscious activity of the eyes as a sensory focus.

¹⁵³ Jaëll, Marie. *Les Rythmes du regard et la Dissociation des doigts*. Paris: Alcan, 1906.

¹⁵⁴ "*On se rend compte qu'en prenant pour point de départ vos expériences de pianiste, vous avez établi les plus subtiles corrélations entre les perceptions tactiles, auditives et visuelles. Cela est sans doute assez difficile pour le gros des lecteurs, mais extrêmement suggestif pour ceux qui aiment à réfléchir sur le fond des choses.*" Lettre d'Edouard Schuré à Marie Jaëll, février 1907.

a. Dissociation of the Thinking

*"In seeking the dissociation of the fingers by means of the education of the musical touch, I found a faculty more precious still: the dissociation of thought."*¹⁵⁵ The origin of this observation was a simple fact: the more Jaëll was able to simultaneously do different things with her fingers, the more she was able to make her brain think differently. Additionally, Jaëll remarked how dissociated motions were only rendered artistic and not mechanical if their pictures appeared first in the brain. In Jaëll's words: *"The artistic fecundation of movements operates through this preexisting image that determines the movements' rhythmic pace and correlatively the musical phrase's rhythmic pace that is conveyed to the keyboard through these movements."*¹⁵⁶ As they press the keys, fingers transmit to the keys a driving force regulated by the cerebral activity. Jaëll notes that this generating force exists equally in the visual sense: *"Between the transformations of speed that operate in the musical rhythm and the ones that operate when I analyze the shifts made by my eyes on linear shapes, the relationship seems so evident that I classified my impressions here, in order for others, better equipped, to define these phenomenon in a different and better way."*¹⁵⁷

¹⁵⁵ *"En cherchant la dissociation des doigts au moyen de l'éducation du toucher musical, j'ai trouvé une faculté plus précieuse encore: la dissociation de la pensée."* Jaëll, Marie. *Les Rythmes du regard et la Dissociation des doigts*. Paris: Alcan, 1906. p. 1.

¹⁵⁶ *"La fécondation artistique des mouvements s'opère par cette image préexistante qui détermine l'allure rythmique des mouvements et corrélativement l'allure rythmique de la phrase musicale transmise au clavier par ces mouvements."* Ibid, p. 1.

¹⁵⁷ *"Entre les transformations de la vitesse qui s'opèrent dans le rythme musical et celles qui s'opèrent lorsque j'analyse les déplacements effectués par mon regard sur des contours linéaires, l'identité m'a paru si évidente que j'ai classé mes impressions à ce sujet, afin que d'autres, mieux armés, puissent chercher à définir ces phénomènes d'une façon autre et meilleure."* Ibid, p. 2.

Undoubtedly, Jaëll's experiments would have been facilitated by technology. But the question remains whether newer research technology would have sufficiently whet her appetite for more intuitive discoveries.

b. Fingers' Influence on Auditive and Visual Perceptions

In *Les Rythmes du regard et la Dissociation des doigts*, Jaëll analyzes the memory of the first time she heard Liszt play, in Rome, 1868. As soon as Liszt started playing, Jaëll's auditory perceptions were instantly transformed, in such an unexpected way that the radical change in the way she was listening made a stronger impression than Liszt's playing itself. She recalls how during that time she had the impression of having been affected by "*musical shortsightedness*."¹⁵⁸ At that moment, she discovered that sounds could have an architecture: as she was following a musical phrase, anterior sounds would unexpectedly come back to her mind, opening new perspectives. The music she heard did not seem to be the music originally composed, but "*an ideal transfiguration of this music, a music infinitely more beautiful, infinitely more divisible, where it is precisely the smallest gradations of rhythm and dynamics (those that cannot be converted into notation signs) that were generating the deepest, the more lasting impressions*."¹⁵⁹ It was as if her musical thinking had acquired, independently from her will, the

¹⁵⁸ "*Il semblait qu'atteinte jusque-là de myopie musicale, j'avais tout à coup découvert qu'il existe une perspective dans l'audition des sons: je ne pouvais, en effet, suivre une phrase sans être, à l'audition de certains sons, forcée de revenir vers certains autres sons déjà lointains.*" Ibid, pp. 3-4.

¹⁵⁹ "*Il faut bien le dire, ce n'est pas la musique telle qu'elle est écrite par le compositeur, que j'entendais, c'est la transfiguration idéale de cette musique, une musique infiniment plus belle, infiniment plus divisible, dans laquelle précisément les gradations les plus infimes des rythmes et des nuances (celles qui ne peuvent plus se traduire par les signes de l'écriture) produisaient les impressions les plus profondes et les plus durables.*" Ibid, p. 4.

ability to freely walk inwards or backwards on new unknown paths. In 1868, Jaëll was nevertheless not yet able to establish the cause for such a momentary change in her musical perception. But in 1906, she had a more precise idea.

On a music score, notes are grouped by distinct points that does not seem to have any shared life, but a connection exists regarding the way notes influence each other with their length and intensity. Notation does not define this relationship, but great artists perceive it and act on their listener's mind by communicating new faculties allowing to decipher the musical language. Jaëll describes how Liszt's playing suggested to her brain a new memory of sounds and explains it by his *"prodigious fingers dissociation, intimately connected to the transcendental cerebrality of his playing."*¹⁶⁰ It was as if each of his fingers had its own single state of awareness, in which he perceived *"such as in a quadruple mirror, different states of conscience for every other finger."*¹⁶¹ Indeed, if one plays with ten fingers, the brain should consider that it operates with twenty-five fingers. With every dissociation of sensations comes a new dissociation of the thinking.

To Jaëll, tactile sensations have a harmony and are related together like silent music. It is an artistic duty to perfect one's manual activity since our hands have the potential to influence our hearing as well as our gaze. Jaëll's experiments showed that auditive and visual perceptions could substantially change under the influence of just a simple change of attitude communicated to the thumb and index. She explains how the idea of creating a tactile ring superposing the

¹⁶⁰ *"Et c'est précisément la prodigieuse dissociation des doigts de Liszt, intimement reliée à la transcendante cérébralité de son jeu, qui a provoqué le perfectionnement momentané de ma mémoire, et par conséquent de ma pensée musicale."* Ibid, p. 5.

¹⁶¹ *"On peut dire qu'en raison de cette dissociation tout à fait exceptionnelle, Liszt possédait de chacun de ses doigts un état de conscience distinct dans lequel il percevait, comme dans un quadruple miroir, les états de conscience différents de chacun de ses autres doigts."* Ibid, p. 5.

thumb and index germinated as she was listening in her mind to the succession of eighth notes in the first Paganini-Schumann Etude. She established this tactile ring by superposing the thumb and index finger pads in order to make them match the following fingerprint:



Tactile Ring

Superposition of Thumb and Index Finger pads

Les Rythmes du Regard et la Dissociation des doigts, p. 7.

Jaëll then mentally listened to the Etude while making a tactile ring with the thumb and the index and realized that not only was the sonority more transparent and clear, but rather than regularly succeeding themselves like distinct unites, these eighth notes were grouping themselves by groups of two: the second note was coming closer to the first one, while departing from the following note. They were grouping themselves as strong and weak beats, but every weak beat sounded like a consequence of the strong beats. This rhythm was not generated metronomically, but instead organically.

This unexpected result occurred mentally, from an internal audition freed from any external sonic influence. As the tactile ring adjusted her tactile sensations, a grouping occurred between the sounds, and her cerebral activity started to perceive a new rhythm. Her ear

*"perceived not only the difference in intensities between even and odd sounds, but also a different timbre."*¹⁶² Thereafter, she realized that the same phenomenon was happening with her auditive acuity when she was attending a live performance. As listening to a choir, voices would have a more transparent and penetrating timbre as soon as she would bring the thumb and index finger pads together as a tactile ring. The same occurrence would happen with instrumental music. There were more connections between the sounds, a circulating thought which would connect them together in a more thorough, intimate and profound way.¹⁶³

Jaëll transposed this finding to visual perceptions, spending more than a year analyzing research on a daily basis. She observed that she could perceive the most diverse rhythmic transformations in every movement. In one instance, Jaëll tracked with her eyes two mason laborers who were working on a staircase on her street. Since they were wearing all white, shadows were mirroring on their clothes at the slightest movement. But in addition to being able to discern the start and end of these successive shadows, she was able to further observe increasingly precise physical gestures. Their movements were like the mechanism of a clock: they were easily perceptible, but looking closer, she would discern an inner speed in constant transformation. This led Jaëll to establish an analogy between the musical rhythm and the rhythm of the gaze: *"It is worth mentioning that if the action exercised by the tactile ring seemed much more pronounced in the visual representations than in the auditory ones, there is nevertheless a striking analogy between the two phenomena; firstly, if instead of hearing successions of regular*

¹⁶² *"C'est au même moment où mes sensations tactiles se modifiaient, que d'une part mon activité pensante changeait de rythme, tandis que d'autre part mon oreille percevait non seulement des différences d'intensité entre les sons impairs et les sons pairs, mais elle percevait un autre timbre."* Ibid, p. 9.

¹⁶³ *"Il y a comme plus de pensée dans les sons, parce qu'ils semblent, par des causes cachées, se relier entre eux d'une façon plus intime."* Ibid, p. 9.

eight notes, I was perceiving them in groups in which even and odd sounds were connecting to each other while parting themselves from the other groups; I was on the other hand also seeing, in these professional gestures, the regularity of successive impulses transforming itself. Because all movements perceived by my gaze had acquired two distinct characteristics: accelerated and decreasing motions."¹⁶⁴

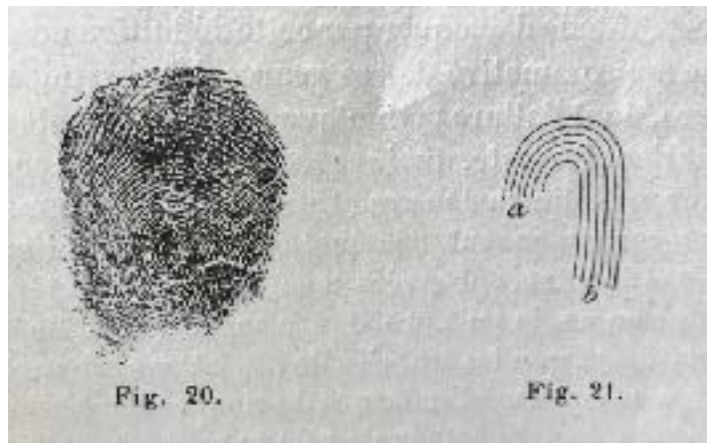
c. Rhythmic Attractions and Orientations in the Hands

Tactile sensations array through linear paths formed in our finger pads. To Jaëll, all of these tactile lines can be divided into a multitude of nervous elements that make us feel differently not only with each of our ten fingers, but with the tiniest part of our finger pads' regions. The modification of sensibility in this manner correlates with the sonority created at the piano, and with the dimensions we perceive as touching an object, as seen in *Le Mécanisme du Toucher*. Indeed, a *"pianist's brain should operate as if it perceived twenty-five fingers on each hand. Because the indirect influence exerted by the twenty 'phantom fingers' coincides with the harmonics of the sonority that the smallest changes of touch placement, that is to say, the inclination of attitudes cause to evolve.*"¹⁶⁵ In this context, harmonics are not acoustic harmonics

¹⁶⁴ *"Il est à noter que si l'action exercée par l'anneau tactile semblait bien plus accusée dans les transformations visuelles que dans les transformations auditives, il existait néanmoins entre les deux phénomènes une analogie initiale frappante; car si, d'une part, au lieu de continuer à entendre des successions régulières de doubles croches, je percevais soudain ces doubles croches par groupes dans lesquels les sons impairs et pairs se reliaient entre eux en s'écartant respectivement des groupes voisins, je voyais aussi, d'autre part, dans ces gestes professionnels, la régularité des impulsions successives se transformer, puisque tous les mouvements perçus dans mon regard avaient acquis deux caractères bien distincts: les mouvements qui allaient en s'accéléralant, et ceux qui allaient en se ralentissant."* Ibid, p. 10.

¹⁶⁵ *"Notons ici, incidemment, que si le cerveau du pianist doit opérer comme s'il percevait vingt-cinq doigts dans chaque main, c'est que l'influence indirecte exercée par les vingt 'doigts fantômes' coïncide avec les harmoniques de la sonorité que les plus minimes changements de la localisation des touchers, c'est-à-dire l'inclinaison des attitudes, font évoluer."* Ibid, pp. 29-30.

but instead internal harmonics that she was perceiving throughout her hands, of which sensations developed to such an extent that she could perceive in a continuous way the vibrational state and complex orientation of linear paths circulating in her hands. More, Jaëll could represent different intensities in each finger pads, and a constant circulation she describes with the following sketch:



Les Rythmes du Regard et la Dissociation des doigts, p. 31.

Figure 20 shows the localization of these sensations, in the right hand index, and Figure 21 describes the main flow she perceived. Trajectories of sensations circulate from a to b before returning to a. The maximum sensibility is located in the "a" region, the minimum in the "b" region. Because the rhythmic pace is in constant transformation, Jaëll explains that it is difficult to give, even approximately, a clear representation of the sensations she experienced. She still describes how in these trajectories, she had *"the impression of aspiring through the fingertip a strength that accumulates from the maximum of sensibility a to the minimum b."*¹⁶⁶

In addition, Jaëll compares the fingertips of the second, third, fourth and fifth fingers to a succession of tiny magnets; the fingers' dissociation would then act on the degree of

¹⁶⁶ *"J'ai dans ces trajectoires l'impression d'aspirer, pour ainsi dire, par le bout du doigt une force qui s'accumule du maximum de la sensibilité a au minimum b."* Ibid, p. 32.

magnetization. Jaëll goes even further by seeing a magnetic field between the three spaces separating these fourth fingers, where tactile sensations harmonize themselves in these empty spaces through invisible links: *"In these conditions, an uninterrupted exchange of influences establishes itself through these three magnetic fields."*¹⁶⁷ The degree of magnetization is different in each of these three fields, which all gravitate towards a common terminus, the thumb. Reciprocally, the thumb will be attracted with the same intensity to the other fingers, but because of its opposite orientation, *"it operates in the space that separates it from the other fingers, a sort of sealing of sensations."*¹⁶⁸

In this way, the different attractions and orientations existing between all fingers as well as in the space between the fingers assimilate both hands to a compass that works continuously with musical thinking. It is as if the hands had an inner gaze that would help connecting the flow of tactile sensations circulating between the fingers by creating a visual inner map of the different attractions and orientations. The orientation of these tactile sensations in relation to the music itself enhances the artistic energy even more.

d. Rhythmic Variations of the Gaze

Jaëll devoted considerable time to discussing different phenomena of the gaze's function because they are closely related to the orientation of tactile sensations in the hand and fingers.

¹⁶⁷ *"Dans ces conditions, il se formerait dans chacun des trois espaces qui séparent ces doigts un champ magnétique différent, à travers lequel s'établit, entre la sensibilité minima d'un doigt et la sensibilité maxima du doigt suivant, un échange ininterrompu d'influences."* Ibid, p. 33.

¹⁶⁸ *"Le pouce sera attiré avec non moins d'intensité vers les autres doigts, d'où résulte qu'il s'opère dans l'espace qui le sépare des autres doigts une espèce de fermeture des sensations."* Ibid, p. 34.

She saw an analogy between the rhythmic transformations perceptible by the gaze and rhythmic transformations by which our thinking circulates through the linear pathways of our finger pads. Using the rhythmic perspective, Jaëll's intention was to discover new relations among aural, visual and tactile sensations, since she believed that the mental mechanism that commands the fingers pressures on the keys also regulates the eyes' movements.

As seen in *L'Intelligence et le Rythme dans les Mouvements Artistiques*, uniform motions impede the mechanism of the thinking, since *"we are unable to think through intermittence a movement that we are trying to make uniform."*¹⁶⁹ But if a movement accelerates towards a direction at a gradually accelerated pace, it stimulates the thinking. In this case, the mechanism of the movement and the mechanism of the thinking share a similar pace.

Reversely, Jaëll notices the same phenomenon of mental and manual fusion under the influence of a gradually delayed movement. More interestingly, the same phenomenon happens if the gaze makes the movements instead of the hands. Concretely, if the gaze follows the contours of a circumference, she observes how: *"In each circuit, the gaze gradually slows down its pace in the ascent, and then accelerates gradually in the descent; the form is not only perceived in the space it occupies, but it is felt, it is calculated in time: there is a fusion between the representation of the rhythm over time, and the representation of the form in space."*¹⁷⁰

¹⁶⁹ *"Quelque effort qu'on tente, on est incapable de penser sans intermittences un mouvement qu'on cherche à rendre complètement uniforme."* Ibid, p. 16.

¹⁷⁰ *"Si on laisse le regard parcourir une circonférence sans diriger son rythme, il s'établit des vitesses différenciées nettement évolutives. C'est-à-dire: dans chaque parcours le regard ralentit graduellement sa marche dans la montée, et l'accélère ensuite graduellement dans la descente; la forme n'est pas seulement perçue dans l'espace qu'elle occupe, mais on la sent, on la calcule dans le temps: il y a fusion entre la représentation du rythme dans le temps, et la représentation de la forme dans l'espace."* Ibid, p. 17.

Furthermore, she notices that whether the gaze can follow its own natural rhythm or whether it is conducted by a uniform motion, its pace will always present characteristic disruptions. Nevertheless, visual sensations will differ if the movement becomes uniform, as it was the case for the tactile sensations. It seems that we continue to see the circular form by the space it occupies, but *"that we cease to understand the image, because the rhythm communicated to the gaze no longer agrees with it. We see the form exist in space, we no longer feel it exist in time. There is a reciprocal negation between the two representations of space and time."*¹⁷¹

Jaëll carefully observes how the eyes behave when perceiving lines, rectangles, squares, circles, spirals, straight lines or curves, parallel or perpendicular lines. And she notes how the rhythms of the gaze are directly dependent of the geometric shapes of the lines it scopes and remain variable, picking up acceleration or losing it depending on the orientation. Jaëll's broadens these observations to rhythm in visual arts and nature, in relation to inner perceptions. She brings attention to the fact that if paintings influence our gaze, some of them are also more likely than others to provoke irrepressible rhythmic impulses. She demonstrates this using the example of a marine art: *"If, for instance, after having followed the undulating movement of one of the main waves, I want to effect a similar trajectory in the next wave, my gaze, far from letting itself be guided, takes an inverted impulse and returns to the initial focal point with a surprising vivacity, as would the water of a wave itself."*¹⁷²

¹⁷¹ *"Pendant qu'on s'applique à rendre l'allure du regard uniforme, il se fait un changement frappant dans les sensations visuelles: il semble qu'on continue à voir la forme circulaire par l'espace qu'elle occupe, mais qu'on cesse de comprendre l'image, parce que le rythme communiqué au regard ne concorde plus avec elle. On voit la forme exister dans l'espace, on ne la sent plus exister dans le temps. Il y a négation réciproque entre les deux représentations de l'espace et du temps." Ibid, p. 19.*

¹⁷² *"Si, par exemple, après avoir suivi le mouvement ondulant d'une des vagues centrales, je veux effectuer un trajet analogue dans la vague suivante, mon regard, loin de se laisser guider, prend un élan en sens inverse et s'en retourne avec une vivacité surprenante vers son point de départ, comme le ferait l'eau de la vague elle-même." Ibid, p. 148.*

Additionally, Jaëll observes how these rhythmic inspirations, however ephemeral, leave unforgettable impressions and act consistently on our memory. Rhythm has the power to perfect what Jaëll names "*musicality of the gaze*,"¹⁷³ a manifestation of the rhythmic transformations that occur in the variations of the gaze, and more generally in every visual motion perceived in daily life. The most unexpected variations happen with the conductivity of the gaze, which either loses its liberty of action or becomes stimulated. Pointing out how, depending on the painting, the eyes motions differ remarkably, Jaëll notes that "*only defective works paralyze the flow of her gaze*."¹⁷⁴

To illustrate, Jaëll uses the bas-relief of the François Rude, *The departure of the Volunteers of 1792*. As she contemplates the sculpture, she explains how her gaze retains extreme mobility, because "*all ways are opened to it, not only in all the forms that I see, but in the space which separates me from these forms; after each impetus by which I move towards this bas relief, I can feel it coming back at me, as if these forms stimulated its activity so as to make me feel the reality of the link that remains between the image that I carry on my retina, and the forms that provoke it*."¹⁷⁵

On the other hand, in the *Triumph of 1810* by Jean-Pierre Cortot, Jaëll notices the fixedness of her gaze, which stayed trapped in the lines. She can sense that the lack of unity in

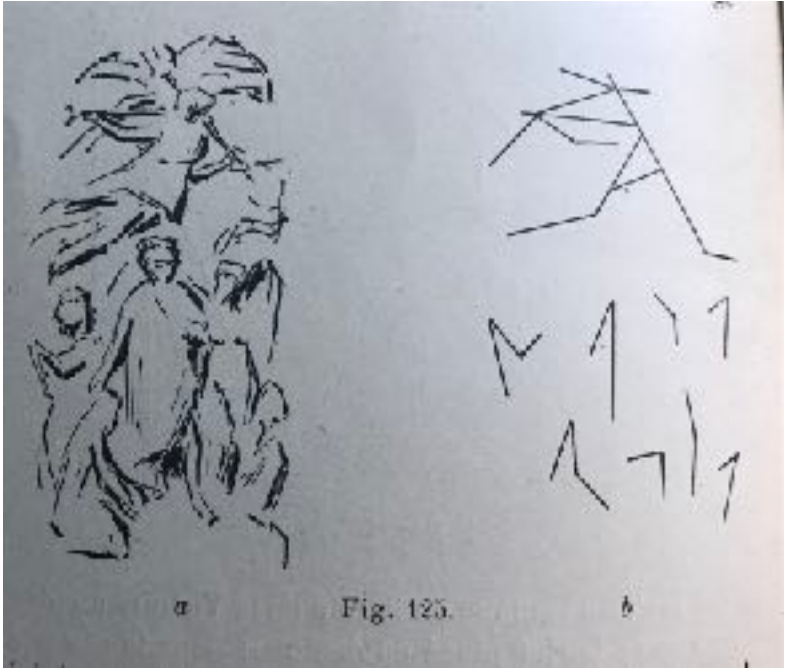
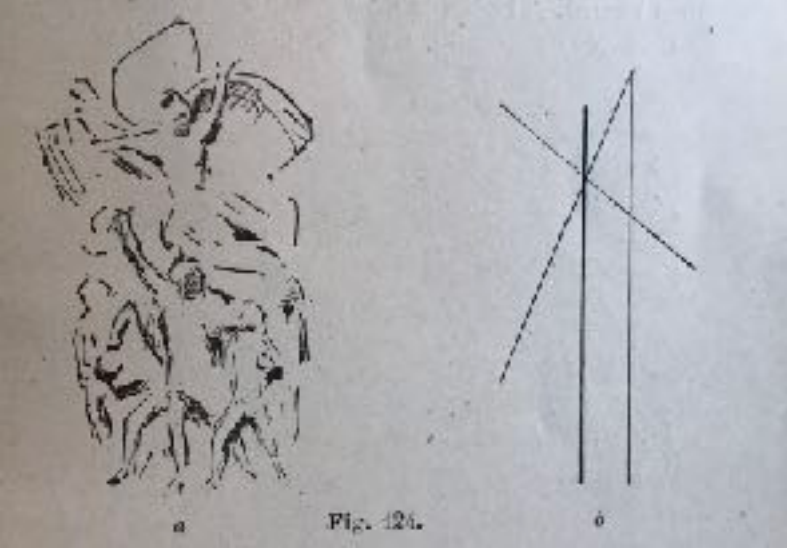
¹⁷³ See: Jaëll, Marie. *L'Intelligence et le Rythme dans les mouvements artistiques*. Paris: Alcan, 1904. p. 29

¹⁷⁴ "*Les oeuvres défectueuses, seules, paralysent ainsi mon regard.*" Jaëll, Marie. *Les Rythmes du regard et la Dissociation des doigts*. Paris: Alcan, 1906. p. 149.

¹⁷⁵ "*Mon regard conserve une mobilité extrême; toutes les voies lui sont ouvertes, non seulement dans l'ensemble des formes que je vois, mais dans l'espace qui me sépare de ces formes; après chaque élan par lequel je me dirige vers ce bas-relief, je puis le sentir revenir vers moi, comme si ces formes stimulaient son activité de manière à me faire sentir la réalité du lien qui subsiste entre l'image que je porte sur ma rétine, et les formes qui la provoquent.*" Ibid, p. 150.

this work inhibits the activity of her gaze. In order to visually demonstrate this observation, she sketched the lines responsible for these two opposite activities of the gaze.

Les Rythmes du Regard et la Dissociation des doigts pp. 151-152.



These external rhythms influence inner rhythms because rhythms create a reciprocity between the outside and internal world: *"The work of art provokes an uninterrupted exchange of influences by which the gaze, directed outwards, towards the perceived forms, is in some way animated by these forms; it may well be that the spectator is, unconsciously, much more moved by the activity displayed by his gaze, than by the cause that provoked it. Similarly, the activity deployed by the sense of hearing in the audition of a musical work could be most intensely correlated with the emotion felt by the listener, than by the work itself."*¹⁷⁶

The sense of rhythm is not only the faculty used to accurately decompose a measure; it is the ability to decompose and sense movements in time and space, and to feel three-dimensional attractions and orientations. Marie Jaëll reflected that *"the human being, whose thought has acquired a more immediate and intense activity of internal displacement, would thus also be able to perceive, through the displacements of his gaze, with a greater intensity, the life spread around him: he would thus feel more in possession of the secret forces that animate it, and more intimately connected with all that, in perceived nature, grows and moves, is born and dies."*¹⁷⁷

She concluded with an analogy between the shape of the trees and their rhythmic oscillations, a marvel of proportion. Through observation and imagination, she would feel the different forces that animate the inner rhythmic structure of the tree. To Jaëll, even the common

¹⁷⁶ *"L'oeuvre d'art provoque un échange ininterrompu d'influences par lesquelles le regard, dirigé en dehors, vers les formes perçues, est en quelque sorte animé par ces formes; il se pourrait ainsi que le spectateur soit, inconsciemment, bien plus direction ému par l'activité déployée par son regard, que par la cause qui l'a provoqué. De même, l'activité déployée par l'ouïe dans l'audition d'une oeuvre musicale pourrait être en corrélation la plus intense avec l'émotion ressentie par l'auditeur, que l'oeuvre elle-même."* Ibid, p.152.

¹⁷⁷ *"L'être humain dont la pensée a acquis une activité de déplacement interne plus immédiate et plus intense, serait ainsi à même de percevoir aussi, à travers les déplacements de son regard, avec une plus grande intensité, la vie répandue autour de lui: il se sentirait par ce fait plus en possession des forces secrètes qui l'animent, et plus intimement relié à tout ce qui, dans la nature perçue, pousse et se meut, naît et meurt."* Ibid, p. 168.

act of looking at a tree or a straight line on a piece of paper is an active process, much as dutiful observation of rhythmic phenomena actively makes us perceive, see and think.

4. New State of Awareness and Tactile Colorations

When Charles Féré passed away in 1907, Jaëll lost not only support from a colleague, but a friend. For the past ten years, they had worked closely together, combining their knowledge to merge sciences and art through physiology. Once again, Jaëll found herself alone. Nevertheless, Jaëll persisted in her research with even greater intensity. Determined to refine the tactile sensibility and the harmony of the touch as much as possible, she explored new spheres on her own, while becoming increasingly secluded. Aside from a few close friends and group of students, she limited her visits and spent entire days refining her observations in isolation. At this time more than any other, she was more than ever in search of truth in the arts, using the physiological medium. Convinced that the search for beauty must coincide with the search for truth to be meaningful, Jaëll explored without respite the resources of the hands.

Despite all her previous findings, by 1910 Jaëll was still dissatisfied by the lack of full understanding of the hand's physiology; she still considered that the conscience she had of her hand was too vague, and had to be replaced by a state of full awareness that would encompass all tactile, visual, and auditive sensations.

a. Rhythmic Associations of the Gaze with Colors

As Jaëll analyzed the circulation of the gaze in *Rhythms of the Gazes and Dissociation of the Fingers*, she noticed that colors influenced the rhythm of the gaze. Depending on whether the

colors were warm or cold, the rhythmic pace of the gaze accelerated or slowed. She therefore individually analyzed colors from the light spectrum and noticed that:

- Purple activated the rhythm of the gaze the most.
- Blue had a bit less stimulating action, but depending on the kind of blue, it acted on the gaze with almost as much intensity as purple.
- Yellowy orange stimulated the gaze as much as blue. Lighter yellows nevertheless decelerated the rhythm of the gaze.
- Red stimulated the rhythm of the gaze only very slightly, and even created a resistance.
- Green did not stimulate the rhythm and created a more important resistance than red.

She then associated the colors together and noticed new differences of rhythm, depending on how colors were paired together. She observed, for instance, that purple was the most likely to influence the temperament of other colors. And that red and green, red and purple, and blue and yellow were the combinations of colors that were the most likely to influence each other as pairs. Surprisingly, she noticed how these combinations were much weaker if the gaze followed an elliptic path. She nevertheless left these findings at a state of observation and would experiment with them for a few years, collecting her daily deductions on notebooks. When she published *Un Nouvel État de conscience: la Coloration des Sensations Tactiles*¹⁷⁸ ("New State of Awareness: coloration of tactile sensations"), in 1910, followed by *La Résonance du toucher et la Topographie des pulpes*¹⁷⁹ ("Resonance of the Touch and Topography of the pulps"), in 1912, Jaëll would develop and adopt more knowledge on the use of colors in physiology.

¹⁷⁸ Jaëll, Marie. *Un Nouvel État de Conscience: la Coloration des Sensations Tactiles*. Paris: Alcan, 1910.

¹⁷⁹ Jaëll, Marie. *La Résonance du toucher et la Topographie des pulpes*. Paris: Alcan, 1912.

b. New Numeral Denomination of the Ten Fingers

In *Un Nouvel État de Conscience*, Jaëll further explores the idea that pianists should consider working with twenty-five fingers subdivided into five different groupings, rather than the basic five-finger representation. Finger pads should be like compasses, where direction can be individualized to the desired level: *"Thanks to the knowledge of attractions by which these differentiated directions complement each other, we grant, in musical touch, proportionally the sensitivities of our different fingers just as one tunes musical instruments."*¹⁸⁰

But as a first step, it is necessary to change the designation of the ten fingers to enter a new state of awareness. For Jaëll, the classic subdivision of the ten fingers into two symmetric parts comprising two thumbs, two second fingers, two third fingers, two fourth fingers and finally two fifth fingers is overly mechanical and fails to generate any stimulating connections between the fingers. She offers the following fingering designation:

Right hand: 1st, 3rd, 5th, 7th, 9th finger

Left hand: 2nd, 4th, 6th, 8th and 10th finger

With this denomination, the right hand's sensations are represented by odd numbers, the left hand's sensations by even numbers. This designation allows left hand sensations to differentiate at a much greater level left hand sensations from right hand sensations. Indeed, using more distant finger numbers in each hand makes the interdigital space between the fingers

¹⁸⁰ *"Grâce à la connaissance des attirances par lesquelles ces directions différenciées se complètent on accorde, dans le toucher musical, proportionnellement les sensibilités de ses différents doigts comme on accorde des instruments de musique."* Jaëll, Marie. *Un nouvel état de conscience: la coloration des sensations tactiles*. Paris: Alcan, 1910. p. 3.

more clear, and reinforces their independence from each other.¹⁸¹ This deceptively simple use of fingerings allows a more precise picture of our ten fingers to develop and stimulates the instinct of symmetrical sensations.

c. Tactile Colorations

Jaëll noticed for many years that the perception of colors transformed her manual sensibility. Exploring further, she associated chromatic colors of the light spectrum with every finger and immediately noticed that the coordination of sensations improved under the influence of color representations. It was as if every finger was imbued with a different substance, and the whole hand and brain activity were changing: *"While we think of colors, we feel them infuse in our manual impressions, as if they determine new activities. They likewise infuse themselves into the sonority that the pressures transmitted to the keyboard evoke. The timbres of the sound are colored or discolored according to whether the tactile impressions of the performer are colored or discolored. In reality, as soon as colored representations intervene, tactile sensations are illuminated, as if new vital elements were introduced into the consciousness of the hand. It seems*

¹⁸¹ *"Non seulement on différencie mieux les impressions gauches des impressions droites, et inversement, mais, par l'intervention des cinq chiffres plus distants, l'ouverture des espaces interdigitaux apparaît plus nettement."* Ibid, p. 5.

that tissues that have remained opaque and indivisible are made transparent and provoke new sensory images."¹⁸²

Concretely, terms such as index, ring finger, thumb, pinkie do not stimulate in our perception differences that actually exist. In the same manner, determining our fingers' mutual position without any help from the eyes and gestures is a slow and laborious process. On the other hand, the simultaneous representation of colors is immediate. Indeed, a mere reference to blue, red, or green instantly allows us to mentally differentiate all these color tones. But the fact remains that our hand's potential is inhibited by our poor perception of it. Our conventional denomination of the different fingerings is a manifestation of this limitation.

Jaëll wonders why our lack of finger dissociation is commonly accepted as a normal trait of inferiority: *"How is it possible to consider with curiosity people affected with color blindness and not be surprised at our inability to execute, for example, a movement that is either extended to the middle finger, without having all the others fingers take more or less part in this action? Color blindness is an infirmity of sight whose causes have been studied: our lack of dissociation of the fingers, the consequences of which have a gravity so particular, constitutes a curable infirmity.*"¹⁸³ To Jaëll, this disability is not a natural one. It is the reflection of a lack of manual

¹⁸² *"Pendant que nous pensons les couleurs nous les sentons s'infuser dans nos impressions manuelles, comme si elles déterminaient des activités nouvelles. Elles s'infusent de même dans la sonorité que les pressions transmises au clavier évoquent. Les timbres de la sonorité se colorent ou se décolorent selon que les impressions tactiles de l'exécutant se colorent ou se décolorent. En réalité, dès que les représentations colorées interviennent, les sensations tactiles s'éclairent, comme si des éléments vitaux nouveaux s'introduisaient dans la conscience de la main. Il semble que des tissus restés jusque-à opaques et indivisibles sont rendus transparents et provoquent des images sensibles nouvelles."* Ibid, p. 7.

¹⁸³ *"Comment se fait-il qu'on considère avec curiosité les daltonistes qui prennent une couleur pour une autre, et que l'on ne s'étonne pas de notre incapacité à faire exécuter, par exemple, un mouvement tant soit peu étendu au médium sans que tous les autres doigts prennent plus ou moins part à cette action? Le daltonisme est une infirmité de la vue dont on a étudié les causes: notre manque de dissociation des doigts, dont les conséquences ont une gravité si particulière, constitue une infirmité guérissable."* Ibid, p. 8.

sensibility generated among others by the way we designate our fingers. Because the traditional designation of fingers obstructs manual and mental functions, Jaëll proposes the following denomination:

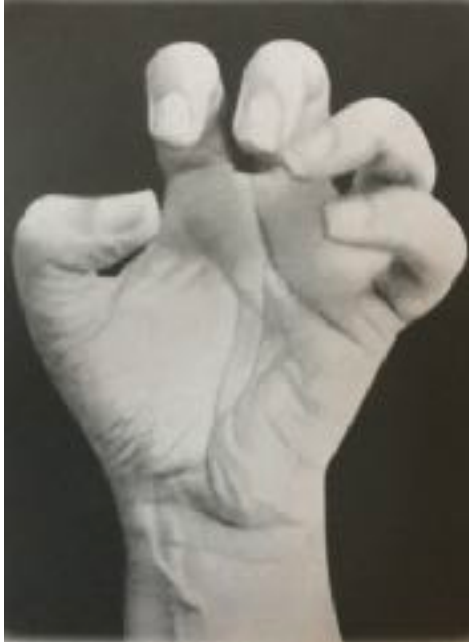
- Index: red finger
- Third finger: orange yellow finger
- Fourth finger: green finger
- Little finger: blue finger
- Thumb: purple finger

Under the influence of colors, tactile sensations are filtered, change their orientations and one can feel fingers vibrate like *"individualized tuning forks."*¹⁸⁴ If the unconventional character of colored sensations can create some perplexity, the following pictures can provide credibility to this approach:



Opening of Jaëll's hand in 1907, before the application of tactile colorations.
Benoit, M.-C., Frénéa, M.-C., Grunwald, D., Polio, C.
L'Education artistique de la main, selon l'enseignement de Marie Jaëll, pianiste et pédagogue.
Lyon: Symétrie, 2010. p. 11.

¹⁸⁴ "On sent ses doigts vibrer par concordance comme des diapasons individualisé lorsqu'ils émettent des sons différents qui se combinent harmonieusement." Ibid, p. 9.



1909, transformation acquired after starting applying tactile colorations.



1910, continuation of dissociation work through colors.

d. Enlargement of Tactile Sensations

As Jaëll observed for hours the hand of *La Victoire de Rude* at the Museum of comparative sculpture located in Paris Trocadéro, her perception of the hand changed significantly. She describes: *"At first, I did not know how to look at this hand... These hours spent in visual exercises nevertheless left deep traces in my body. From one day to the next, I felt the motility, the conductibility of the gaze progress, I became more familiar with the image of this hand; it was taking life. This big hand seemed to me more in correlation with my small hands. . . . It is while continuing this research, that I unexpectedly had the idea to attribute*

different colors to each finger of this molded hand. From the first tests, the colors seen mentally reflected on my sensitivity, so as to transform all my manual impressions. The sensations experienced in my hand became more durable because they tended to work better with each other. The sensitivity of my hand seemed to me for the first time comparable to a language whose meaning I understood."¹⁸⁵ The visual enlargement of this hand thus generated for Jaëll a strong mental representation of her finger pads' papillary systems. But this clear idea only emerged after hours of studious observation. At the beginning, the interdigital spaces did not coordinate in her mind, because she was not able yet to mentally see through the hand.

This inexperience also impeded the activity of her gaze and her sensations. Only after days of practice, she started to feel the sensations of this enlarged hand in relation to her own hands. When she focused on her finger pads, Jaëll started to mentally feel increasingly vivid tactile sensations and sounds.

The striking fact is that slowly, Jaëll began to discern supplementary sounds as well. For instance, if she mentally represented a pressure with the left hand's little finger, she would simultaneously hear the lower octave of this sound, like an added harmonic. In the right hand, this phenomenon was reserved, and the pressure of the little finger would generate a superior harmonic. She attributes the amplification of the auditory range to the mental enlargement of the

¹⁸⁵ *"Au début je ne savais pas regarder cette main... Ces heures passées en exercices visuels laissaient néanmoins des traces profondes dans mon organisme. D'un jour à l'autre, je sentais la motilité, la conductibilité du regard progresser, je me familiarisais davantage avec l'image de cette main; elle prenait vie. Cette grande main me paraissait plus en corrélation avec mes petites mains. . . . C'est en poursuivant ces recherches, que j'ai eu inopinément l'idée d'attribuer à cette main moulée des doigts de couleurs différentes. Dès les premiers essais, les couleurs vues mentalement se sont répercutées sur ma sensibilité, de manière à transformer toutes mes impressions manuelles. Les sensations éprouvées dans ma main sont devenues plus durables parce qu'elles s'accordaient mieux entre elles. La sensibilité de ma main me paraissait pour la première fois comparable à un langage dont je comprenais le sens."* Ibid, pp. 14-15.

tactile observation field. As her tactile perceptions were drawn by the enlarged hand, her state of awareness was able to perceive harmonies of touch, colors, and sounds all at once.

e. Polyphony of Tactile Sensations

The brain of a pianist, if it is developed in such a way that it can cover a full and simultaneous representation of all sounds that comprise the musical system, can only reach its full intensity if it also encompasses the morphologic individuality of the finger pads. To Jaëll, the *"tiny keyboards of our finger pads are the most wonderful instrument of perfection that can be imagined."*¹⁸⁶ In this manner, every one of the finger pads contains an individualized musical system, which has a degree of refinement that helps to hear the silent polyphonies of sounds. Relations between the sounds are enhanced at a higher degree if the pianist feels the relations between the contacts made on the keys. But if touches are produced over the keyboard without any sense of the relationship between them, it provokes what Jaëll calls *"une anesthésie du toucher"* — an anesthesia of touch.

According to Jaëll, *"some relationships between the most subtle differentiated timbres that are specifically discussed here, touch alone can teach to hear them."*¹⁸⁷ She illustrates this by describing a work on the well-known Bach C major Prelude, Well Tempered Clavier I. This piece is particularly well-suited for a study on the polyphony of timbres using different finger pads regions, and allows the performer to get more familiar with the art of touch. To experiment

¹⁸⁶ *"Les claviers minuscules de nos pulpes constituent le plus merveilleux instrument de perfectionnement qui soit imaginable."* Ibid, p. 78.

¹⁸⁷ *"Certaines relations entre les timbres les plus finement différenciés dont il est spécialement question ici, le toucher seul peut apprendre à les entendre."* Ibid, p. 85.

with the new relationships of sounds created by these timbres, only the second fingers from both hands will be used, making a circular motion that will allow their pads' regions to evolve as follows:

- The right hand's second finger plays the three ascending sounds.. The first pressure has to be on the radial side of the finger pads, the second one on the center and the last one on the cubital-ulnar side. Through these three different touches, the sonority gradually evolves from a dark timbre to a clearer one.
- At the same time, the left hand index plays the two ascending sounds first with a pressure on the cubital-ulnar side and a second pressure on the radial side, that creates a resonance that evolves from a clear timbre to a darker one.

Jaëll describes the sounds emitted by the different regions of the finger pad as follows:

- " - Located exclusively on the radial side, the pressures of both index fingers evoke a sonority that is more vibrant, but more closed, darker.
- Located on the center of the two finger pads, pressures will evoke, on the contrary, a less vibrant and more open sonority.
- Located on the cubital side, they will evoke a softer, clearer sonority. "¹⁸⁸

A uniformity of touch would give the false impression that the piece only has one type of sound; in reality, using these different timbres in a coordinated way creates a different polyphony and hierarchy of sounds. The relationship of these timbres is obviously not as easy to perceive as

¹⁸⁸ "-Localisées exclusivement sur le côté radial, les pressions des deux index évoquent une sonorité plus vibrante, mais plus fermée, plus sombre.

-Localisées sur le centre des deux pulpes, les pressions évoqueront au contraire une sonorité moins vibrante, mais plus ouverte.

-Localisées sur le côté cubital, elles évoqueront une sonorité plus moelleuse, plus claire." Ibid, p. 87.

the timbres from an orchestra; it takes a refinement of the ear to polyphonically follow the different resonances of these timbres at the piano, as the polyphony derives from the sounds in their pure form and not from the musical structure. At the same time, the control of these tactile and auditive differences *"exercises a particularly powerful action on the education of the ear. As soon as the ear refines itself, the musical conscience develops. . . . As one refines the education of the hand, our tactile discernment takes on an increased complexity, because it establishes itself on more minuscule differences. Thus, our lack of manual artistic instinct clearly appears to us, because we acknowledge that refinement of the instinct cannot exist without the refinement of the sensations."*¹⁸⁹

In 1910, Jaëll found that the musicality of the hand develops more under the influence of colors. It is only susceptible to the influence of sounds once it has been sensitized to a proper degree by colors. As she would confirm in her next book, *Resonance of the touch and Topography of Finger pads*: *"While under the exclusive influence of colors, the sensibility of the fingers is exalted so as to transform all the activity of the hand, the exclusive intervention of sounds on the contrary, does not exert any effective action on the development of the hand's sensitivity."*¹⁹⁰ In this new book, Jaëll confirmed the phenomena she experienced between 1910-1912 regarding the association of sensations and color representations. Colored tactile

¹⁸⁹ *"C'est précisément par leur finesse extrême que ces différences de résonance, communiquées aux sons, exercent une action particulièrement puissante sur l'éducation de l'oreille. Dès que l'oreille s'affine, la conscience musicale se développe. . . . C'est précisément à mesure que nous affinons l'éducation de la main, que notre discernement tactile prend une complexité croissante, parce qu'il s'établit sur des causes de plus en plus minuscules. Ainsi, notre manque d'instinct manuel artistique nous apparaît clairement, parce que nous reconnaissons que l'affinement de l'instinct ne peut exister sans l'affinement des sensations."* Ibid, p. 89.

¹⁹⁰ *"Mais tandis que, sous l'influence exclusive des couleurs, la sensibilité des doigts s'exalte de manière à transformer toute l'activité de la main, l'intervention exclusive des sons n'exerce au contraire sur le développement de la sensibilité de la main aucune action efficace."* Jaëll, Marie. *La Résonance du toucher et la Topographie des pulpes*. Paris: Alcan, 1912.

sensations are in this way a language that aids perceptive understanding. They enable an experience of the touch and the timbre in unique ways by provoking a new polyphony of harmonics and generating a new conception of one's state of awareness.

In these new states of consciousness, the tactile perception of colors determines the character of tactile perceptions realized by the touch. Just as the mental resonance of harmonics determines the character of the true resonance of sounds emitted by the touch. These new concepts can be voluntarily formed by our conscience through our hands, and can create a physiological map and a network of influences that render our tactile functions coherent and the sound naturally harmonious. The final section of this dissertation will give some examples of concrete ways of applying these new functional aptitudes.

Except from one of Jaëll's notebook, where she compiled her daily observations. The page above is dated Thursday, March 19 1908. Fond BNU Strasbourg. MRS JAËLL. 593,4.

47

la conscience intégrale qu'on peut pro-
 duire dans l'esprit en avant en la vivan-
 ment intérieure. Je l'agit d'une conscience
 intégrale que se ne s'obtient jamais
 d'un coup sans une définition si
 simple.

Prenez trois
 consonnes intégrales

3 5 4
1 3 2

sauter
entendre
et
voir

violet
bleu
vert
jaune
rouge

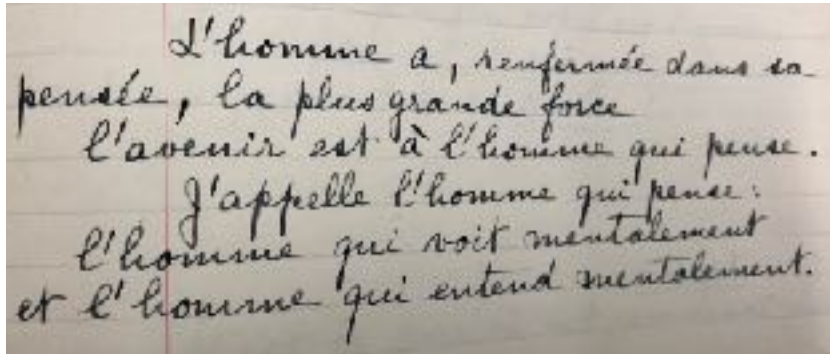
sans qu'il y ait
 son, une substitution de ces
 couleurs efface l'autre

Je fais tout à la fois
 sauter, entendre
 entendre
 et voir

et entendre sauter et voir tout simultanément -
 C'est la conscience
 intégrale
 qu'il faut développer

E. CONCRETE APPLICATION

1. Philosophical Approach of Physiology



BNUS. Fonds Marie Jaëll. Notes drafted by Héléne Kiener from Marie Jaëll's workbook for the purpose of her first biography.

"Humans have enclosed in their mind the greatest strength. Future belongs to the human who is thinking, the human who sees mentally, the human who listens mentally."

Before studying applications of Jaëll's method, it is necessary to understand it as a philosophy that aims to create a new state of awareness towards music; a state of consciousness where art has to expand to the widest variety of areas, in order to fight against the unconsciousness that obstructs its physiological and mental perfection. To this philosophy, only conscious work has a value because it develops intelligence and can be shared. Only a conscious effort has been experienced with the required intensity and depth; only a voluntary effort can be accurately transmitted to others. In the same vein, the end goal of this physiological state of awareness is to let the music itself teach the musician, thanks to the perfectibility acquired by their musical conscience through refinement of tactile, auditive and visual sensations.

Afterwards, art can gradually shift from an indefinable ideal towards an accessible and perfectible area controlled by intelligence.

Jaëll's emphasis of the importance of consciousness in her *Method of the Touch* is in resonance with Jung, who discussed in *Psychologie und Erziehung* the fear among artists that a conscious psychological analysis would devour their creative strength. In Jung's view, the real creative faculty is an endless source that cannot be obstructed, as there is no power on earth that could have prevented Mozart and Beethoven from creating.¹⁹¹ If Jung sees the unconscious as a power that can generate a conscious strength in a creative way, Jaëll's work incites the instinct and the thinking to cooperate for the benefit of art. When she criticizes the unconsciousness, it is because by itself, it confines our intuition and prevents us from exploring our resources and faculties, not because the unconscious has no creative potential.

Furthermore, Jaëll argues that art's complexity is intimately connected to the mechanism of our mental functions. It is an artistic duty to be aware of and develop the creative potential of these functions. To Jaëll, one's own will and determination are the only limits to this development. As Jaëll states: *"To know that one is imperfect, one must know oneself; to correct oneself, one must conquer oneself; in order to conquer oneself, one must know what constitutes perfection and practice. This is the task of study."*¹⁹²

Movements that are made without any thinking mechanism are for Jaëll the reflection of a humanity that confines itself in its passivity. She describes the uniform movement as being

¹⁹¹ Jung, Carl. *Psychologie und Erziehung*. Zurich: Rascher, 1946. p. 92.

¹⁹² *"Pour savoir qu'on est imparfait, il faut se connaître; pour se corriger, il faut se vaincre, pour se vaincre, il faut savoir en quoi consiste le perfectionnement et le pratique. C'est la tâche de l'étude."* Kiener, Hélène. Marie Jaëll, 1846-1925; Problèmes D'esthétique Et De Pédagogie Musicales. Bibliothèque D'esthétique. Paris: Flammarion, 1952. p. 115.

*"the emblem of humanity limited in its acts, of which each individual, in the displacement of his own body, gives an image: he takes a step, to start again and to take another step, and so on."*¹⁹³

Jaëll's philosophy of creative thinking implies that any cerebral or physical movement must be done with a full state of awareness. And this awareness must be accurately guided by an extreme perfectibility of physiological sensations. Mind and body were considered separate from each other for a long period, and this imprecision still persists in music, where the musical thought is isolated from the fingers' movement that manifests it. On the contrary, the quality of a movement resides in the thought that generates it.

Jaëll did not pretend to create a new philosophical aesthetic with her ideas, but she utilized physiology to serve her quest for truth in art. She admitted that her ideas pointed with a great insufficiency toward an then-unknown physiological truth, but hoped that *"one day, perhaps, when by manual and therefore intellectual improvement this truth will be practically explored, philosophies will pale before its fulfillment, because their dreams will be replaced by new realities higher than these dreams."*¹⁹⁴

In Jaëll's view, the performer is the real musical instrument, and the piano is simply a mirror transforming sensorial combinations into music. The performer, as an instrument, must be tuned through the physiologic refinement of the hands, to create a harmony with the 'musicality

¹⁹³ *"Du reste, ce mouvement est en quelque sorte l'emblème de l'humanité bornée dans ses actes, dont chaque individu, dans le déplacement de son propre corps, donne une image: il fait un pas, pour recommencer et faire un autre pas, et ainsi de suite."* Jaëll, Marie. *L'Intelligence et le Rythme dans les mouvements artistiques*. Paris: Alcan, 1904. p. 50.

¹⁹⁴ *"Un jour, peut-être, lorsque par le perfectionnement manuel et, par conséquent, intellectuel, cette vérité sera pratiquement explorée, les philosophies pâliront devant son épanouissement, parce que leurs rêves seront remplacés par des réalités nouvelles plus hautes que ces rêves."* Ibid, p. 168.

of thinking.' Thanks to the three dimensional space of the piano and under the influence of tactile sensations, the performer then can become "*a complex resonator.*"¹⁹⁵

As a more self-conscious approach of the sound emerged at the dawn of the Nineteenth-Century with the development of sound recording, and performance became increasingly individualized, Marie Jaëll focused on the touch, not the sound. In her first *Method of the Touch* in 1894, Jaëll concluded that a beautiful touch could be acquired by equality of the fingers, flexible hands, and quality of the sound emission. She noticed that as soon as a student stopped stiffening the hands, the touch improved. Still, this simple fix, while helpful, was not enough by itself. A beautiful sonority is continually perfectible and necessitates a deep complementary work away from the piano, which allows the performer to analyze multiple relations provoked by the sensations experienced in the hand, the compass of the sound.

¹⁹⁵ "*Sous l'influence de la conduction des sensations, provoquées par le déroulement des touchers, l'exécutant devient en réalité un résonateur complexe.*" Ibid, p. XII.

2. Exercises Away from the Keyboard

The following exercises are excerpts from Jaëll's thirty-three notebooks (1903-1923), from the ones transmitted to her students at the end of her life, and from the updated 1899 publication of *Le Toucher; Enseignement du piano basé sur la physiologie*. They are original in that they need to be done away from the keyboard. Indeed, the keyboard itself does not render fingers more independent or improve the hand's physiology; instead, it transmits their independence and tactile, auditive and visual perceptions. Jaëll said how *"It is not the hand as it is placed on the keyboard that must be felt, it is the one that is seen mentally. . . . This contrast between what is visible and what is sensible, must first be provoked by education."*¹⁹⁶

- Sensitization of the hand away from the keyboard.

First, the hand should be perceived in space, by opening it without any tightness, the palm of the hand at visual distance. This hand position is very similar to the hand from Rude's *Départ des Volontaires* that Marie Jaëll observed for days at the Trocadero Museum. The primary purpose of this exercise is to observe how the hand opens up in the space, to become aware of the phalanges of every finger and to feel the difference of orientation of the index and third finger. As the hand opens up, both fingers move apart from each other, and the middle finger becomes the bisector line of the hand. It is important to take breaks and repeat the same exercise

¹⁹⁶"Ce n'est pas la main telle qu'elle est posée sur la clavier qu'il faut sentir, c'est celle qui est vue mentalement. . . . Ce contraste entre ce qui est visible et ce qui est sensible, il faut d'abord le provoquer par l'éducation." Jaëll, Marie. *Cahier No. 4, 1907-1909, "Dans la nuit du 15 au 16 décembre."* BNUS Fonds Marie Jaëll.

a few times, so that one can feel different sensations each time, such as the arm and hand suspension in space, and the elasticity of the hand.



Detail of the hand observed by Jaëll in *Le Départ des Volontaires*, de François Rude.
Paris, Arc de Triomphe.

- Understanding the natural function of every finger

In her *Method of the Touch*, Jaëll presented the natural function of every finger and stressed that one should be clearly aware of the functional difference of every finger away from the piano in order to gain a better independence.

The thumb is the most independent finger and acts as a generator finger for the other four. Jaëll mentioned in *Le Mécanisme du Toucher* how pianists are often forced to use the thumb in a ‘non-physiological way,’ since the key is being pressed by the part of its finger pads opposed to the region where its sensitivity is the strongest.

The second finger is the "*mediator finger*." It receives the force transmitted by the thumb's action and passes it to the weaker fingers. The balance between the thumb and the second finger provides a structure to the hand and therefore must be specially watched and adjusted. If the second finger's motions are incorrect, the second finger cannot transmit its energy to the other fingers and would "*despite the thumb action, leave the weak fingers to their natural powerlessness*."¹⁹⁷

The third finger, at first sight, seems independent, not receiving or giving anything. To Jaëll, its true physiological nature appears as the fourth and fifth finger acquire more independence and strength. It then becomes the gravity center of the finger's movement, because it balances the sonority of the two strong fingers (thumb and index) with the one of the two weak fingers (fourth and fifth finger).

Jaëll points out that the fourth finger has "*admirable qualities*" but does not have the power to manifest them: "*It is the invalid finger; yet it is from it that the validity of the whole depends, that is to say the weighting, the unity. So far it has been thought that this unfortunate finger must be subjected to torture in order to render it vigorous, while it is simpler to cure it by the force which the thumb and the second finger must transmit to it*."¹⁹⁸ Accordingly, if the thumb and the second fingers work together in order to build a reliable foundation for the other fingers, they will make the fourth finger more solid and independent.

¹⁹⁷ "*Le second doigt est le doigt médiateur. Le pouce lui transmet une force qu'il communique à son tour aux doigts plus faibles. Il faut, pour cette raison, spécialement veiller sur lui; car la moindre incorrection de ses mouvements empêcherait cette transmission de force et laisserait malgré l'action juste du pouce les doigts faibles à leur impuissance naturelle.*" Jaëll, Marie. *Le Toucher. Enseignement du piano basé sur la physiologie, 3 volumes*, Leipzig - Paris: Breitkopf-Härtel-Costallat, 1894. Vol. 1 p. 2.

¹⁹⁸ "*Le 4ème doigt, quoi qu'il ait des qualités admirables, n'a pas, par lui-même, la force de les manifester. C'est le doigt invalide; pourtant c'est de lui que dépend la validité de l'ensemble, c'est à dire la pondération, l'unité. Jusqu'ici, on a cru qu'il fallait soumettre ce malheureux doigt à des tortures pour le rendre vigoureux, tandis qu'il est plus simple de le guérir par la force que doivent lui transmettre le pouce et le second doigt.*" Ibid, p. 2.

Once the fourth finger acquires more independence, it will in turn confer more power to the fifth finger. The fifth finger provides a leading sonority and relief to the music by drawing the contours of the harmony and melody.

- Hand's sensitization through colors

One of the primary steps in the education of the hand is to dissociate the fingers. As seen in the previous chapter, Jaëll discovered how colors enlightened her tactile sensations and how the musicality of the hand was only influenced by sounds once it had been sensitized to colors. Obviously, this progression cannot happen in a few days, but must be maintained with a conscious effort over a consistent period of time. But once the hand has been dissociated through the influence of colors, one can notice a convincing change of aspect. Marie Jaëll compares this metamorphosis to a *"plant that revives and blossoms after a prolonged period of numbness,"* adding that *"it is day by day, through sensitive progressions, that my state of awareness and therefore the static and functional state of my hand changed."*¹⁹⁹ The following pictures show flexions of the index, and the extension and abduction of the hand before and after the intervention of colors.²⁰⁰

¹⁹⁹ *"La main de l'adulte, lorsqu'elle se dissocie sous l'influence des couleurs, est comme une plante qui, après un engourdissement plus ou moins prolongé, va revivre et s'épanouir. . . . C'est de jour en jour, par progressions sensibles, que l'état de conscience, par conséquent l'état statique et l'état fonctionnel de ma main s'est modifié."* Jaëll, Marie. *Un nouvel état de conscience: la coloration des sensations tactiles*. Paris: Alcan, 1910. pp. 30 and p. 52.

²⁰⁰ Jaëll, Marie. *Un nouvel état de conscience: la coloration des sensations tactiles*. Paris: Alcan, 1910. pp. 140, 142, 158 and 160.

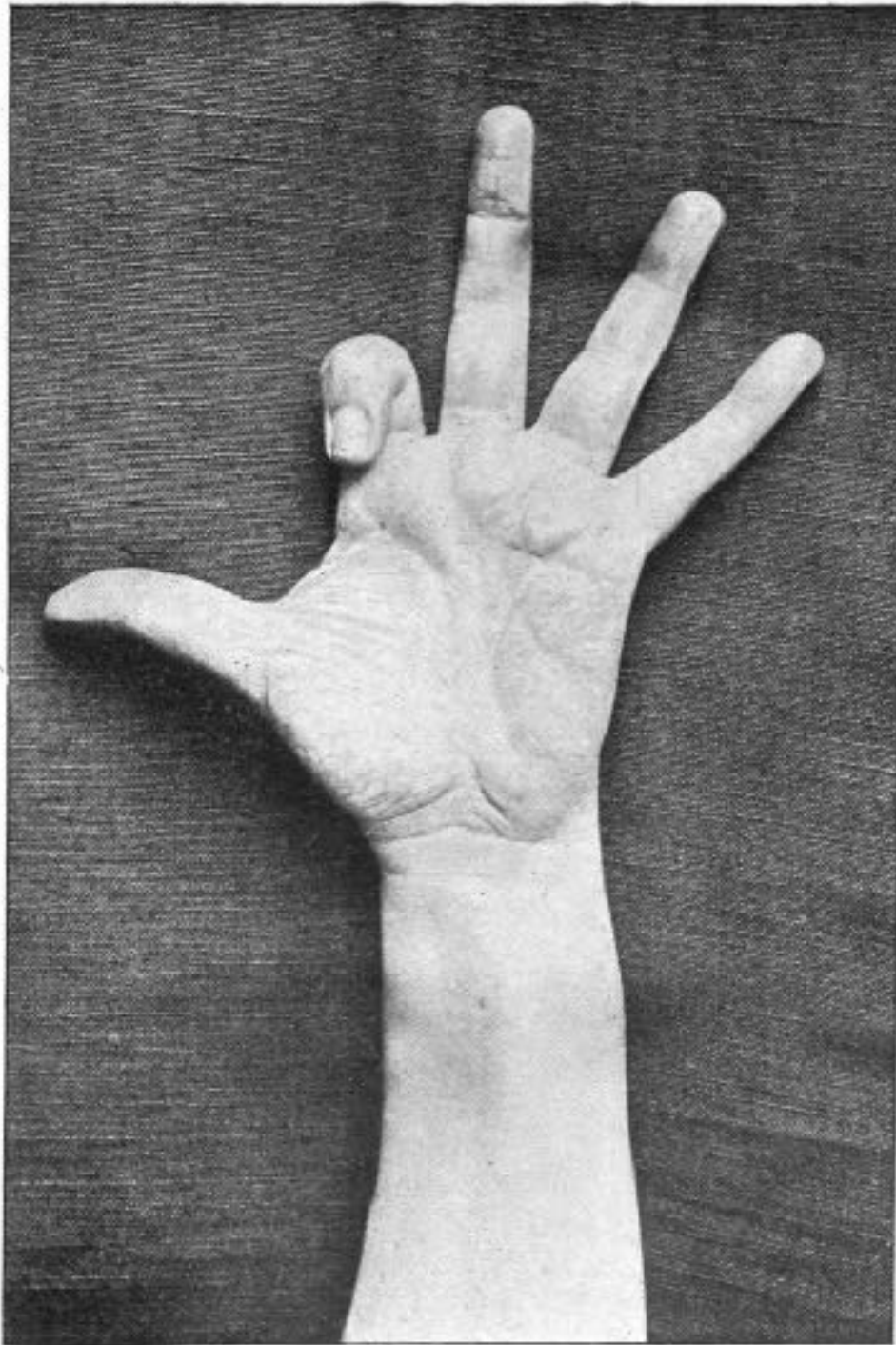


FIG. 6. — Flexion isolée de l'index gauche.

Jaëll, Marie. *Un nouvel état de conscience: la coloration des sensations tactiles*. Paris: Alcan, 1910. p. 140.

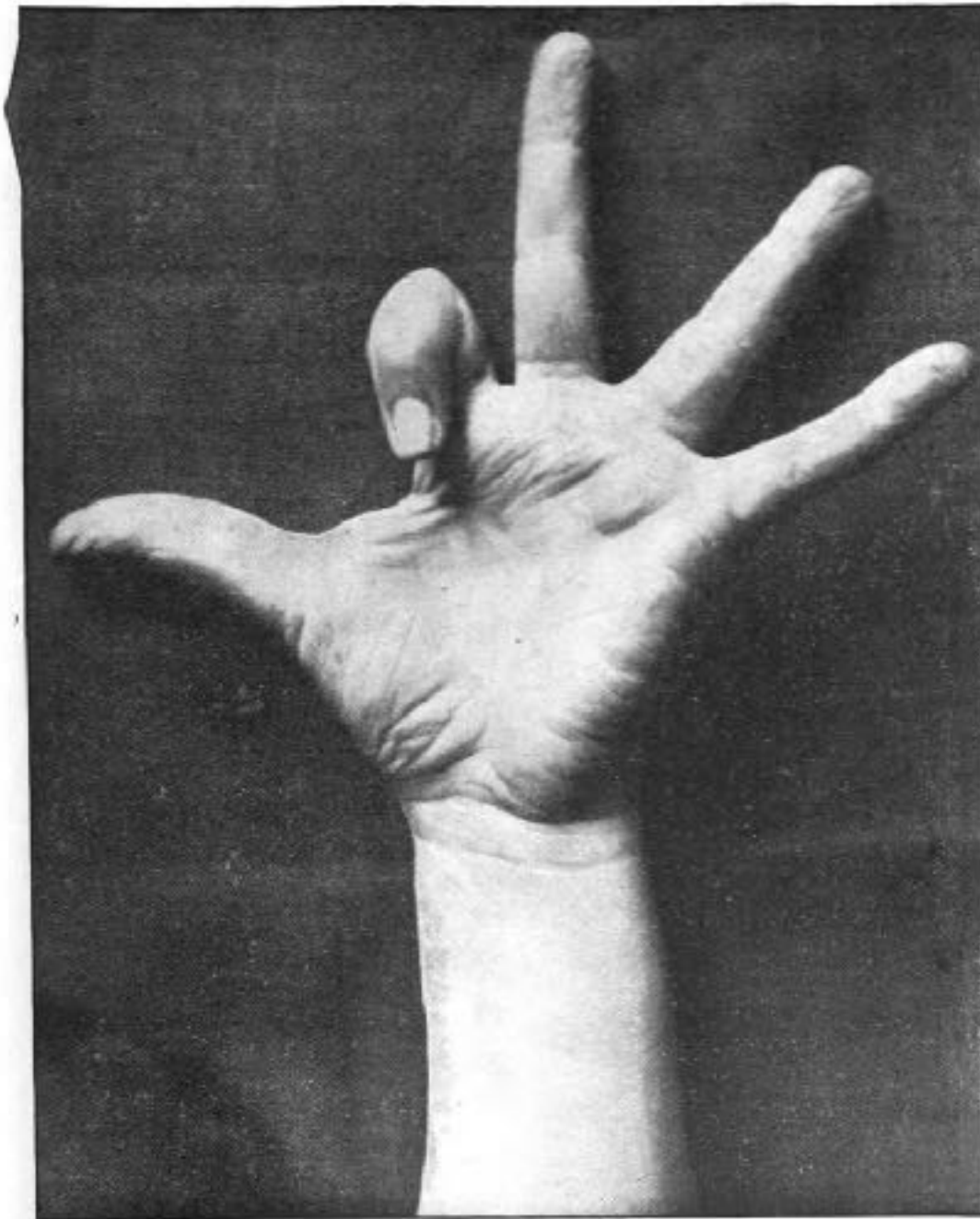


FIG. 6 bis. — Flexion isolée de l'index gauche,
après l'intervention des couleurs.

Jaëll, Marie. *Un nouvel état de conscience: la coloration
des sensations tactiles*. Paris: Alcan, 1910.
p. 142.



FIG. 14. — Extension et abduction de tous les doigts.

Jaëll, Marie. *Un nouvel état de conscience: la coloration des sensations tactiles*. Paris: Alcan, 1910.
p. 158.

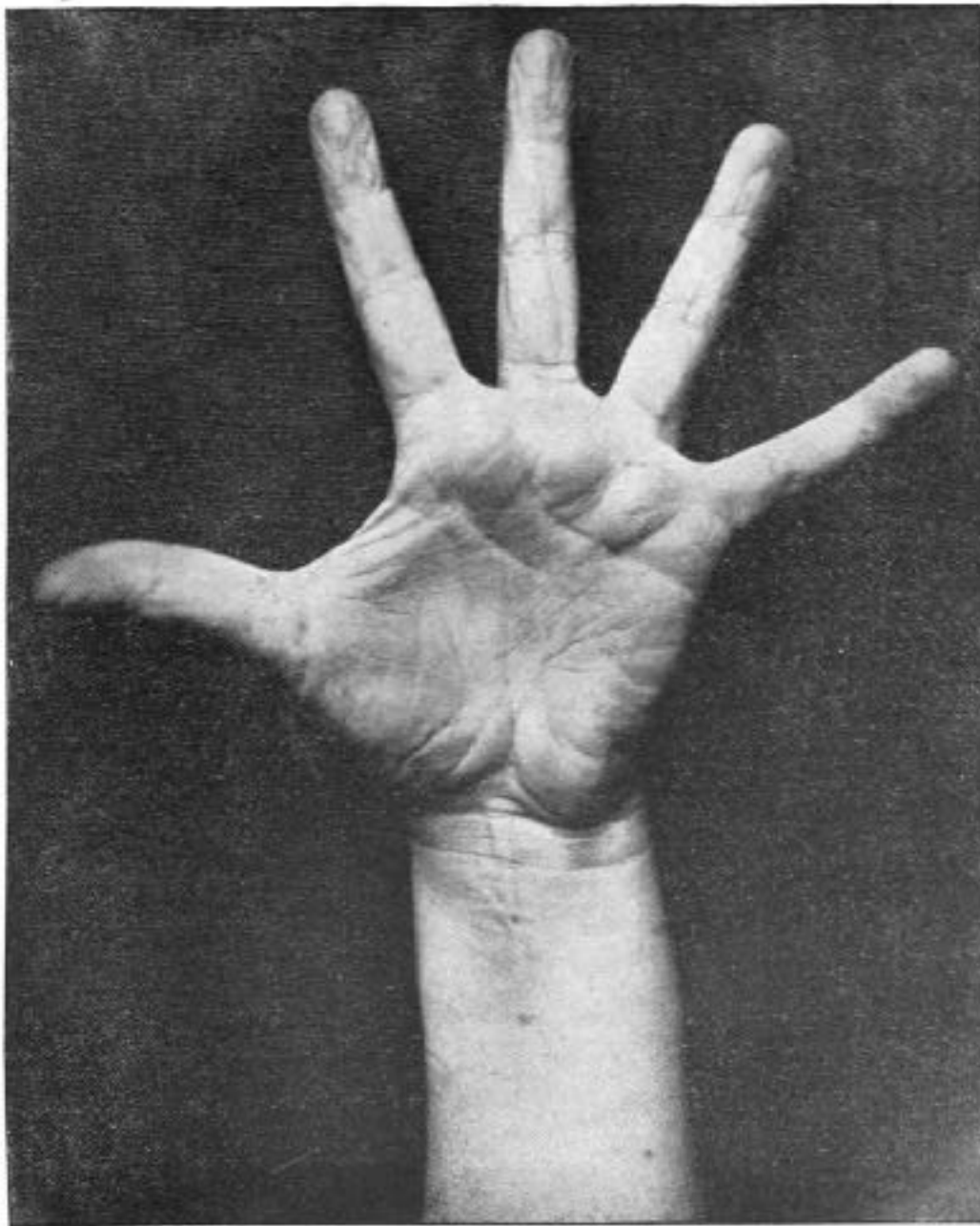


FIG. 14 bis. — Extension et abduction de tous les doigts,
après l'intervention des couleurs,

Jaëll, Marie. *Un nouvel état de conscience: la coloration
des sensations tactiles*. Paris: Alcan, 1910.
p. 160.

Jaëll developed colors through her own mental dissociation and observed the results on her own hand and her musical and tactile perception. But she did not pretend to develop a universal exercise that would magically develop color sensations in everyone's hands. Instead, she taught that it was incumbent upon all of us to develop our hand based on our own will and refinement of sensations. Progress in this type of study is unique for everyone.

Despite these instructive pictures, it is likely easier to convince children, working from a clean mental state, rather than adults, that their hand is dissociated by colors. A pedagogical method book by Marie-Charlotte Benoit, whose mother, Angela Heu (1885-1974) was a student of Marie Jaëll, with the collaboration of Marie-Claude Frénéa, Denise Grunwald and Charles Polio, describes an exercise that can be easily and successfully replicated with very young children.²⁰¹ In this exercise, one hand will stay widely open while the index from the other hand follows the contours of the hand as if it was a little train. The departure station will be the basis of the thumb articulation; it will then follow the contours of each finger as if it was traveling up and down the mountains. This exercise helps to sense the hand in space, and must be renewed with color visualization. As the index follows the contours of the hand, the child will imagine that every finger is paired with one of the rainbow colors: purple for the thumb, red for the index, yellow for the third finger, green for the fourth finger, and blue for the little finger. The experience should then be repeated with the addition of different shades of colors. A soft tone will correspond to the region of the pad where the sensitivity is the weakest, and a darker tone will correspond to the most intense region. Since the thumb is opposed to the other fingers, its

²⁰¹ Benoit, M.-C., Frénéa, M.-C., Grunwald D., Polio C. *L'Education artistique de la main, selon l'enseignement de Marie Jaëll, pianiste et pédagogue*. Lyon: Symétrie, 2010.

color tone will be lighter going up, darker going down. For the other fingers, shades of colors will be dark as the index goes up and light as it goes down.

- Fingerings' association

In this exercise, hands are crossed, palms facing away from each other so they create an arch below the hands. The right thumb's pad lays under the lower articulation of the left thumb. The left thumb and index pads surround the metacarpal-phalangeal joint of the right index, as shown below:



Benoit, M.-C., Frénéa, M.-C., Grunwald D., Polio C.
L'Education artistique de la main, selon l'enseignement de Marie Jaëll, pianiste et pédagogue.
Lyon: Symétrie, 2010. p. 13.

Both hands are in contact with each other through the finger pads. The next step is to coordinate the opposite fingers' pressures, using Jaëll's fingering numbering scheme: 1, 3, 5, 7, 9 for the right hand and 2, 4, 6, 8 and 10 for the left hand. The right thumb starts to give a pressure to the left thumb on 1, and the left thumb will respond on 2. Both pressures must

be released together, silently. Both index fingers will proceed to the same exercise, on 3 and 4. The last three equivalent pairs of fingers will proceed to the same pressures on 5-6, 7-8 and 9-10. This results in a stronger distinction between the left-hand and right-hand sensations. Also, thanks to the use of distinct fingerings, the interdigital spaces can emerge clearly in the pianist's visual representation.

- Perfection of voluntary movements

Jaëll always noticed that even some advanced pianists were unable to flex a finger without also flexing the others, a consequence of poor daily use. Ideally, every finger should individually learn how to act independently, without creating involuntary motions from the other fingers. This control will allow fingers to have a better touch, a more precise contact.

This ability must nevertheless to be paired with the perfectibility of immobility: *"Any organ that moves needs support from an organ that does not move."*²⁰² Indeed, immobility is as important as the action itself, as it sets muscles in a state of tension and produces silent and static energy. Within this silence, musical thought can flourish.

The following pictures represent exercises designed to perfect what Jaëll and Féré called *"voluntary movements."* Jaëll described in *Un Nouvel État de Conscience* how Charles Féré *"had defined, through a simple classification, perfected voluntary movements that are important to acquire in order to develop the artistic aptitudes of the hand. This classification is limited to fingers' movements of flexion, abduction and opposition, and defines the elementary*

²⁰² *"Tout organe qui se meut a besoin de l'appui d'un organe qui ne se meut pas."* Jaëll, Marie. *Le Toucher; Nouveaux principes élémentaires pour l'Enseignement du Piano*. Paris: Heugel & Cie Editeurs, 1894. p. 2.

principles on which the perfection of the manual mechanism can be based."²⁰³



Exercices based on Charles Féré and Jaëll's 1907 demonstration.

Benoit, M.-C., Frénéa, M.-C., Grunwald D., Polio C.

L'Education artistique de la main, selon l'enseignement de Marie Jaëll, pianiste et pédagogue.

Lyon: Symétrie, 2010. p. 10.

²⁰³ "Charles Féré a défini, par un classement très simple, les mouvements volontaires perfectionnés qu'il importe d'acquérir en vue de développer les aptitudes artistiques de la main. Ce classement qui est limité aux mouvements de flexion, d'abduction et d'opposition des doigts, définit les principes élémentaires sur lesquels le perfectionnement du mécanisme manuel peut être basé." Jaëll, Marie. *Un nouvel état de conscience: la coloration des sensations tactiles*. Paris: Alcan, 1910. pp. 30-31.



Marie Jaëll, demonstrating finger exercises. Photography taken by Marie Kiener
BNUS Fond Marie Jaëll.

- Fingers abduction

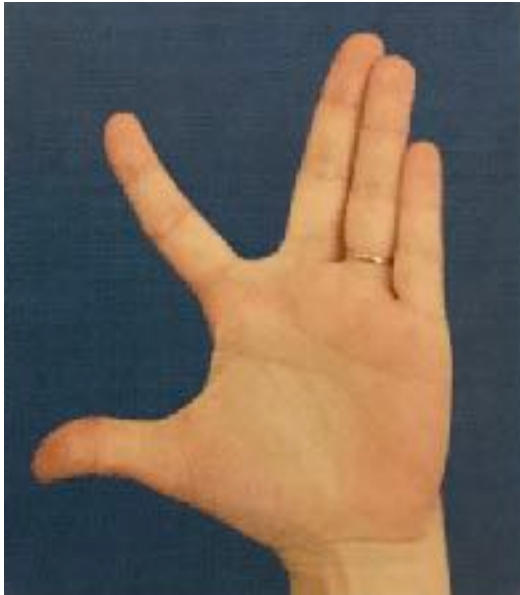
The following exercises, described by Benoît, Frénéa, Grunwald and Polio are intended to develop the interdigital spaces between fingers. The thumb must stay apart the whole time, yet without any tension, and its phalange should be oriented towards the palm of the hand, as shown below.



1. The four long fingers are joined together, which increases the angle with the thumb. This position must be reiterated in between the next exercises, and is a resting position.



2. The little finger slowly moves away from the other three fingers, still joined together, and returns to its initial position.



3. The index slowly moves away from the other three fingers, as if it was attracted by the thumb, creating the widening of two interdigital spaces (between the thumb and the index, and the index and the middle finger).

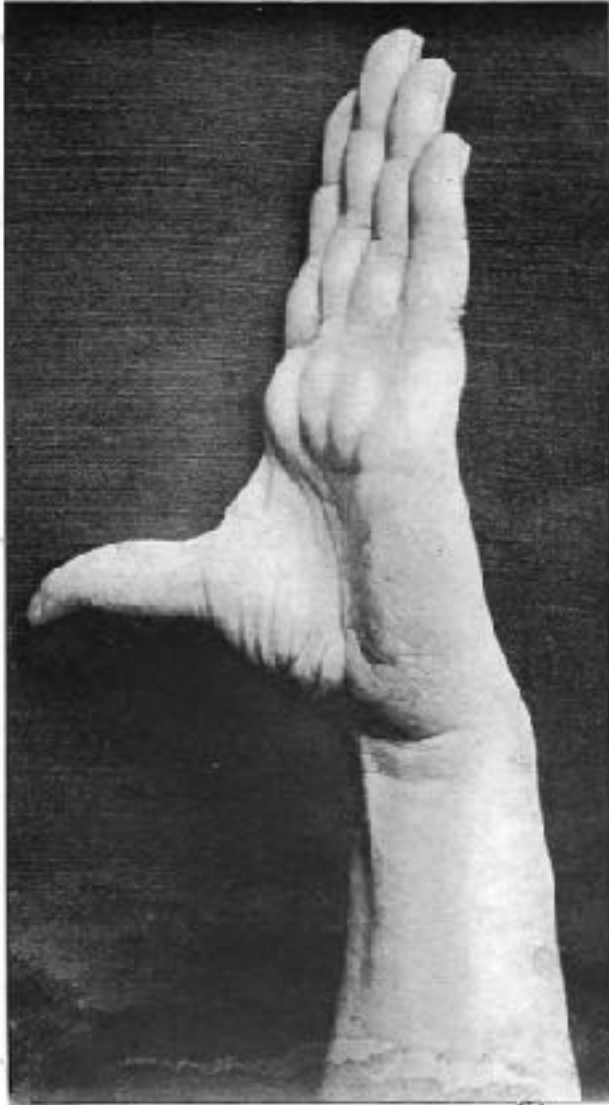


4. Finally, the middle finger and the ring finger slowly move apart from each other. This abduction was particularly important and hard to achieve, according to Jaëll.²⁰⁴

Benoit, M.-C., Frénéa, M.-C., Grunwald D., Polio C.
L'Education artistique de la main, selon l'enseignement de Marie Jaëll, pianiste et pédagogue
Lyon: Symétrie, 2010. pp. 14-15.

The following pictures are Marie Jaëll's hands, and shows the same exercise through a different perspective.

²⁰⁴ ". . . Abduction au troisième espace qui est particulièrement importante et particulièrement difficile à réaliser." Jaëll, Marie. *Un nouvel état de conscience: la coloration des sensations tactiles*. Paris: Alcan, 1910. p. 72.



Abduction of the Thumb. Jaëll's hand.
Jaëll, Marie. *Un nouvel état de conscience: la coloration des sensations tactiles*. Paris: Alcan, 1910 p. 162.

FIG. 15. — Abduction isolée du pouce.



Abduction of the Index. Jaëll's hand.
Jaëll, Marie. *Un nouvel état de conscience: la coloration des sensations tactiles*. Paris: Alcan, 1910 p. 164.

Fig. 16. — Abduction isolée de l'index.

Uof M

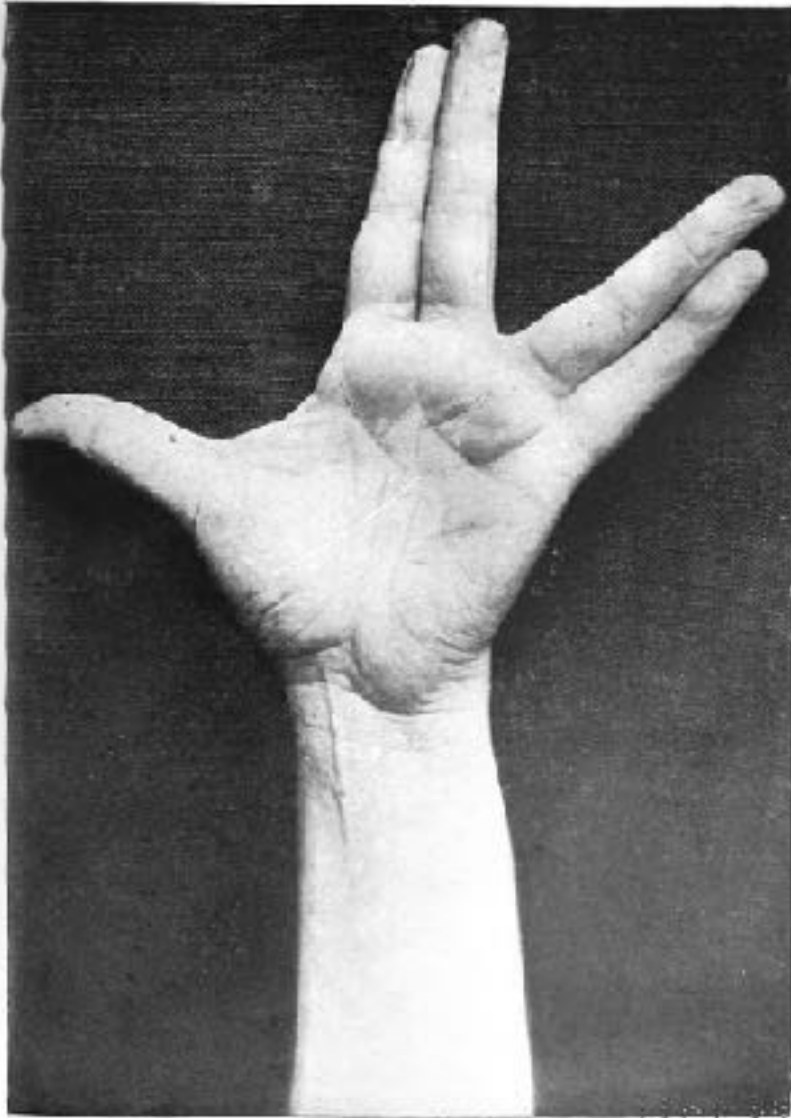
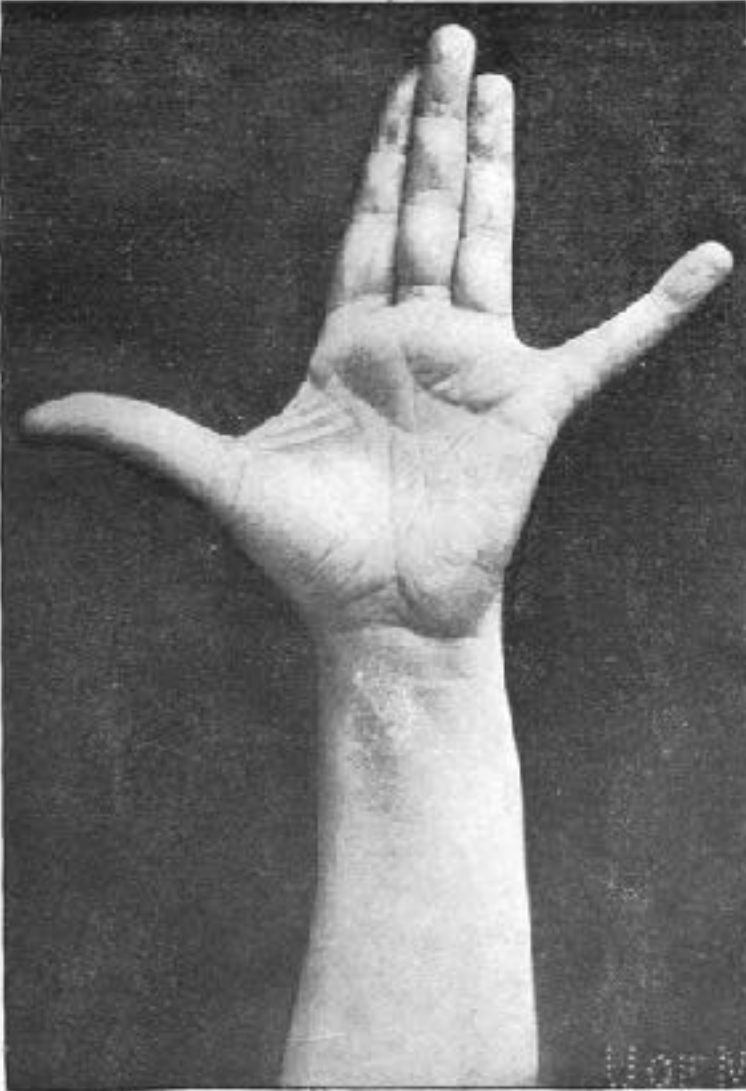


FIG. 17. — Abduction au troisième espace.

Abduction of the third interdigital space. Jaëll's hand.

Jaëll, Marie. *Un nouvel état de conscience: la coloration des sensations tactiles*. Paris: Alcan, 1910 p. 166.



Abduction of the fifth finger.
Jaëll's hand.
Jaëll, Marie. *Un nouvel état de conscience: la coloration des sensations tactiles*. Paris: Alcan, 1910 p. 168.

FIG. 18. — Abduction isolée du petit doigt.

- Tactile Ring

As previously discussed, the tactile ring played an important part in Jaëll's experiments. In this exercise, the thumb touches each finger pad independently in a ring, as shown in the pictures below. Jaëll quoted Charles Féré in *A New State of Awareness* by describing how *"the mobility of the metacarpal can not only serve to perfect the functions of the palm of the hand by increasing its width and capacity, but also to perfect the functions of the fingers in opposition."*²⁰⁵ Because of its physiology, the thumb plays the most important part in the development of the fingers' oppositions.

The tactile ring focuses on individually connecting the thumb and the other fingers by establishing a double contact on the finger pad's region. After finishing the experiment with one hand, the difference of sensation with the other hand is striking. One hand seems asleep while the other one is alive and vibrant. The following pictures show the different oppositions that must be developed through the tactile ring. One can denote the large overture of Jaëll's palm, the apparent control of her finger independence and the harmonious tension in the muscles. Her hand seems to breathe and is incredibly alert, even though the picture was taken more than hundred years ago.

²⁰⁵ *"La mobilité du métacarpe peut non seulement servir à perfectionner les fonctions de la page de la main en augmentant sa largeur et sa capacité, mais aussi à perfectionner les fonctions des doigts dans l'opposition."* Jaëll, Marie. *Un nouvel état de conscience: la coloration des sensations tactiles*. Paris: Alcan, 1910. p. 48.



FIG. 10. — Opposition du pouce à l'index.

Opposition Thumb - Index.

Jaëll, Marie. *Un nouvel état de conscience : la coloration des sensations tactiles*. Paris : Alcan, 1910. p. 172.



FIG. 21. — Opposition du pouce au médium.

Opposition Thumb-Middle finger.

Jaëll, Marie. *Un nouvel état de conscience : la coloration des sensations tactiles*. Paris : Alcan, 1910. p. 174.



FIG. 22 bis. — Opposition du pouce à l'annulaire,
après l'intervention des couleurs.

Uer M

Opposition Thumb-Fourth finger (after the hand has been sensitized to colors)
Jaëll, Marie. *Un nouvel état de conscience : la coloration des sensations tactiles*. Paris : Alcan, 1910. p. 178.



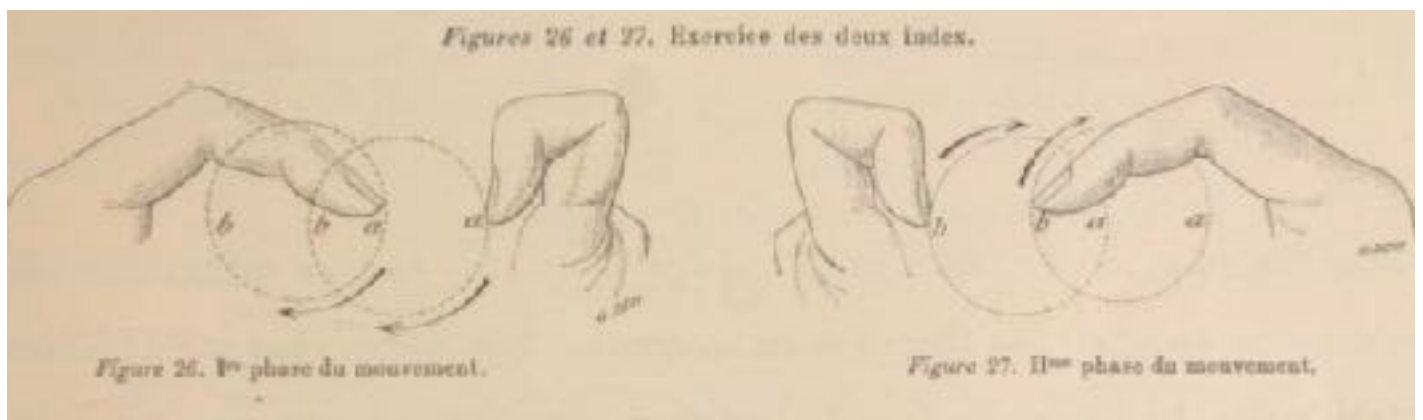
FIG. 23. — Opposition du pouce au petit doigt.

Opposition Thumb-Little finger

Jaëll, Marie. *Un nouvel état de conscience: la coloration des sensations tactiles*. Paris: Alcan, 1910. p. 180.

- Phalanges motions

Finally, it is important to discuss the following exercise based on phalanges circles. Jaëll specifically assigned this exercise to her students when she encouraged them to practice exercises away from the keyboard. This exercise appears in her method *Le Toucher, Enseignement du piano basé sur la physiologie* and consists of two steps.



Figures 26 and 27. Exercise of the two index fingers.²⁰⁶

This exercise consisted of simultaneously rolling and unrolling both index in opposite directions. It is important to contract all muscles as strongly as possible before proceeding. In the first phase of the movement (Figure 26), the tip of the right index completes a circular a-b motion, moving away from the palm of the hand, while the tip of the left hand index completes a circular a-b motion, coming closer to the palm of the hand. The second phase is the exact

²⁰⁶ Jaëll, Marie. *Le Toucher. Enseignement du piano basé sur la physiologie*. Leipzig - Paris: Breitkopf-Härtel-Costallat, 1899. Vol. 1 p. 21.

opposite. The right hand index completes a b-a motion, coming closer to the palm of the hand, while the left hand index completes a b-a motion moving away from the palm of the hand.

This exercise, which must be performed for one to two minutes without interruption, develops the energy flow between both fingers, in a continuous motion. The end goal is for both fingers to become lighter, to develop more precision and feel their attraction towards each others. This exercise also reinforces the contrast between immobility and movement. It is therefore important that the eight other fingers stay fixed and immobile, and accumulate static tension while only the two fingers complete their circular motions.²⁰⁷

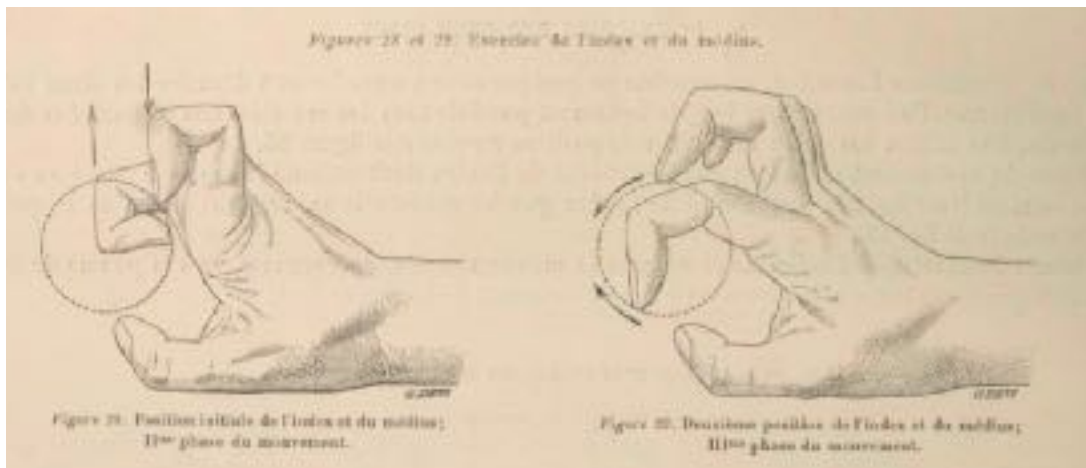
The second exercise, represented below by Figures 28 and 29, is more challenging. The thumb, fourth, and fifth fingers are maintained in tension while the index and middle fingers complete the following movement, divisible into four phases:

- "- First phase: while the middle finger's first phalange goes up to stand vertically, the index's phalange reclines until it reaches a horizontal position.*
- Second phase: both fingers are simultaneously opened to form an arc, as defined in figure 29.*
- Third phase: while the middle finger's phalange reclines to reach a horizontal position, the index's first phalange goes up to stand vertically.*

²⁰⁷ *"Ces deux mouvements se feront sans interruption pendant une ou deux minutes. Mais l'exercice ne sera vraiment utile que si la tension des huit doigt immobilisés s'accroît graduellement durant l'exécution des mouvements, car le progrès est bien moins acquis par l'exercice visible que par l'accroissement de la tension que cet exercice provoque dans les huit doigts immobilisés." Ibid, p. 21.*

- *Fourth phase: both fingers are simultaneously closed and take their initial and respective initial positions (figure 28). The exercise starts again.*"²⁰⁸

Figures 28 and 29. Exercise of the index and the middle finger.²⁰⁹



Jaëll notes that at the outset, students will make the mistake of moving both fingers alternately rather than simultaneously. One of the main difficulties is the communication of a similar rhythm to both fingers, with a perfect balance. Both fingers must act toward one another *"with a counterweight that is perfectly equivalent."*²¹⁰ Jaëll warns, however, that this exercise

²⁰⁸ *"1ère phase: Pendant que la 1ère phalange du médium s'élève pour prendre la position verticale, la 1ère phalange de l'index s'incline pour prendre la position horizontale.*

2ème phase: Les deux doigts sont simultanément ouverts en arc conformément à la position figure 29

3ème phase: Pendant que la 1ère phalange du médium s'incline pour prendre la position horizontale, la 1ère phalange de l'index s'élève pour prendre la position verticale.

4ème phase: Les deux doigts simultanément fermés reprennent leurs positions initiales respectives (fig. 28) et l'exercice décrit recommence." Ibid, p. 21.

²⁰⁹ Jaëll, Marie. *Le Toucher. Enseignement du piano basé sur la physiologie.* Leipzig - Paris: Breitkopf-Härtel-Costallat, 1899. Vol. 1 p. 22.

²¹⁰ *"Pendant qu'on fait l'exercice, on doit avoir la sensation que les deux doigts agissent l'un sur l'autre avec un contre-poids strictement équivalent." Ibid, p. 22.*

should be stopped as soon as the three immobile fingers tire. The right hand should also be exercised before the left one. Once both hands acquire sufficient agility, the combination can be extended to other fingers as follows:

- Immobilization of the thumb, index and fifth finger. Opposite curves conducted by the third and fourth fingers.
- Immobilization of the thumb, index and middle finger. Opposite curves conducted by the fourth and fifth fingers.
- Immobilization of the thumb, third and fifth fingers. Opposite curves conducted by the index and the fourth fingers.
- Immobilization of the thumb, index and fourth fingers. Opposite curves conducted by the third and fifth fingers.

Jaëll indicates that only the second finger will be able to perform perfect circles. The fourth finger motions will necessarily be more elliptical because of its different physiology. At the same time, this exercise seeks to improve the physiological capacity of the hand, without completely denaturing its natural characteristics, contrary to repetitive and mechanical exercises, prescribed in most methods books.

3. Sonic Application

As we approach the sonic application of the touch, it is important to recall how the study of the touch is based on two different types of complementary activities: static activity and dynamic activity. There is indeed a correlation between the capacity of attention, the timbre and the sonority: *"Therefore, without perfection of the muscular tension, there is neither a perfection of the attention nor a perfection of the timbre."*²¹¹

Looking for a way to perfect the muscles static tension, Jaëll argues for a significant change of posture. In order to prevent the hand, the wrist, the arm and the shoulder from inadvertently participating in the fingers' motions through unconscious impulses, the student must sit very low. The keyboard should in this way be half height between the shoulder and the elbow, only during the time devoted to the study of the touch.

Jaëll created exercises to perfect two types of touch: *Glissés* — a sliding motion — and *Roulés* — rolling of the finger pads's between different regions. She recommended to practice the *glissés* first, while using a specific hand position (represented in figure 34): this unique hand position requires a basic tension of the hand's static muscles that will allow even a young beginner to be able to move a finger without making the other fingers move. Jaëll remarks that Chopin was familiar with this hand position, which he maintained even when he was not playing the piano, as evidenced by the molding of his hand.²¹² One can notice a few characteristics with this position: the thumb's first phalange departs from the index, the four fingers' proximal

²¹¹ *"Par conséquent, sans perfectionnement de la tension musculaire, il n'y a ni perfectionnement de l'attention, ni perfectionnement du timbre de la sonorité."* Ibid, p. 10.

²¹² *"Cette position était si familière à la main de Chopin, qu'elle restait acquise même lorsqu'il ne jouait pas du piano, comme le moulage de sa main le prouve."* Ibid, p. 26. See figure 25.

phalanges (figures e, third phalanges) are slightly apart from each other. The medial phalanges (figures f, second phalanges) are in a horizontal position while distal phalanges (figures g, first phalanges) are flexed.

Figure 34
 Jaëll, Marie. *Le Toucher. Enseignement du piano basé sur la physiologie*. Leipzig - Paris: Breitkopf-Härtel-Costallat, 1899. Vol. 1, p. 26.

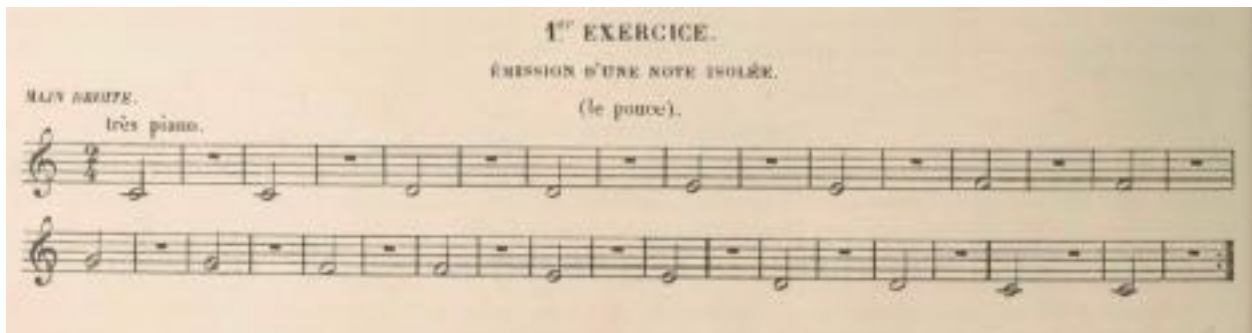


Ibid, p. 26
 Chopin's thumb has a similar angle.



The first part of the exercises presented by Jaëll will therefore have to be executed with muscles in tension, since this fixity "*will allow students to think about the movements they are performing, the sounds they hear, and the tactile sensations they are feeling.*"²¹³

The first exercise focuses on the thumb's emissions on a single note:²¹⁴

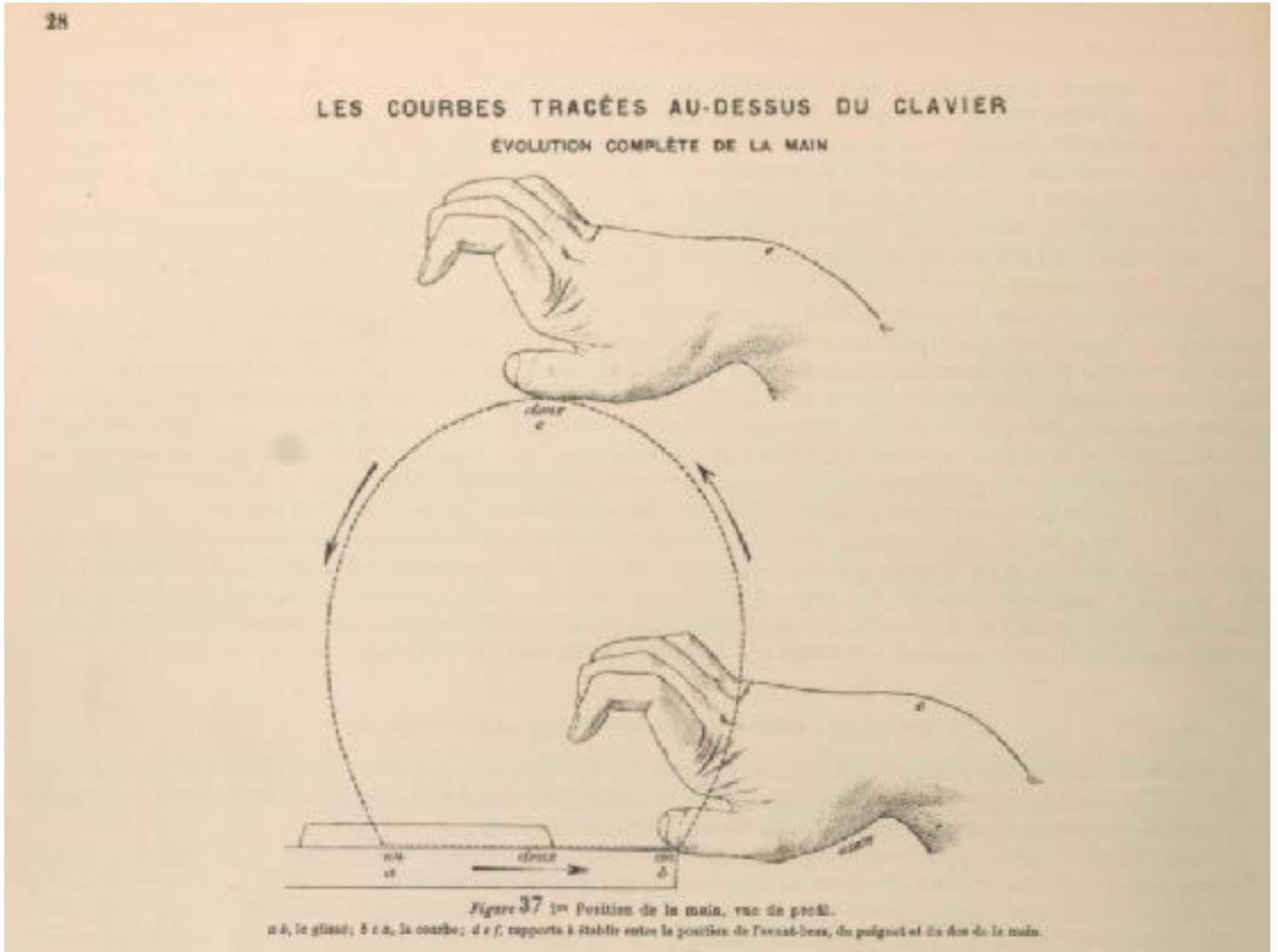


With a *glissé*, the thumb presses the key throughout the length of its phalange. The *glissé* starts at the back of the key (fig. 37 a) and moves forward (fig. 37 b) to match the duration of the sound. Afterwards, the motion continues during the rest, through a curved motion that connects the sound to the next one. The whole gesture is schematized below.

²¹³ "Cette fixité d'attitude correspond à l'intensité avec laquelle l'élève arrive à penser: 1. aux mouvements réalisés; 2. aux sons-entendus; 3. aux sensations tactiles éprouvées." Ibid, p. 27.

²¹⁴ Jaëll, Marie. *Le Toucher. Enseignement du piano basé sur la physiologie*, 3 volumes, Leipzig - Paris: Breitkopf-Härtel-Costallat, 1899. Vol. I, p. 28.

Jaëll, Marie. *Le Toucher. Enseignement du piano basé sur la physiologie*, 3 volumes, Leipzig - Paris: Breitkopf-Härtel-Costallat, 1899. Vol. I, p. 28.



The use of a *glissé* is repeatedly mentioned by Jaëll, who described it for the first time in *Musique and Psychophysiology*, describing Bach's touch: "The impulse or quantity of pressure transmitted to the key must be maintained evenly. In order to do so, the finger must not lift the key perpendicularly, but softly slide along the key, gradually withdrawing into the palm of the

hand."²¹⁵ In addition to training the elasticity and sensibility of the touch, this movement also allows musical thought to be continuous and aids the memory, provided that it is conducted lightly and in proportion with the duration of the sound.

Once the thumb's touch has been refined, the same *glissé* can apply to successions of notes. Jaëll compares this gesture to a bow technique for pianists: "*Just as a violinist plays several notes in a single bow stroke, so in the sequence of notes the successive strokes of the fingers must be united in a single movement slide from the hand.*"²¹⁶ The following sketch represents the whole trajectory that needs to be performed by the other four fingers:



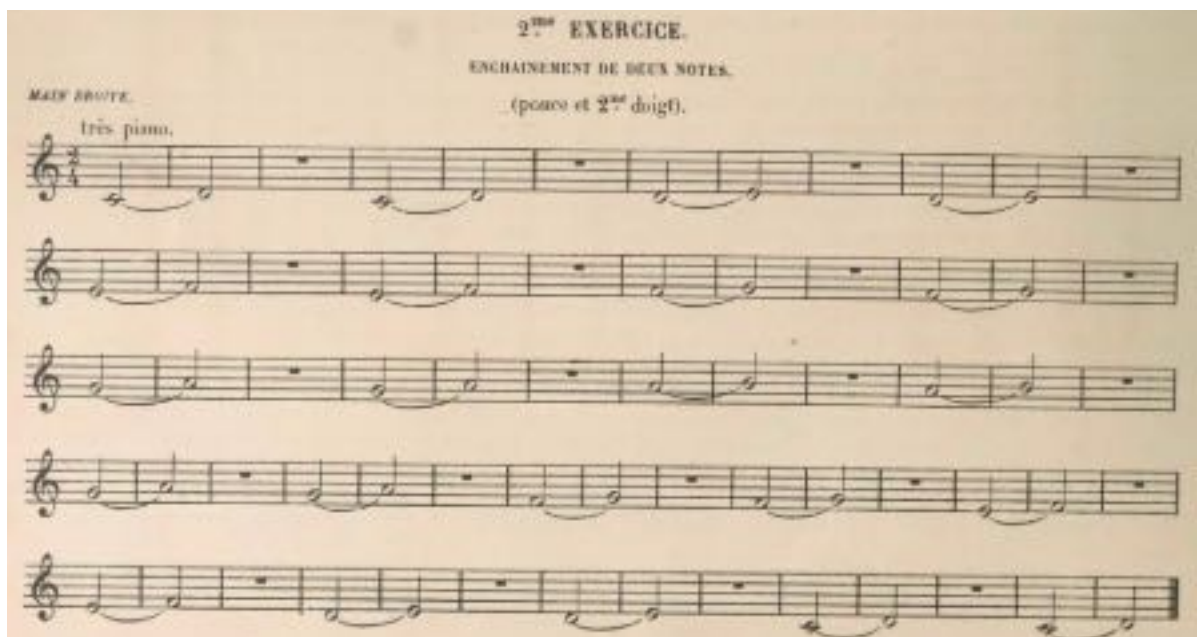
Jaëll, Marie. *Le Toucher. Enseignement du piano basé sur la physiologie*, 3 volumes, Leipzig - Paris: Breitkopf-Härtel-Costallat, 1899. Vol. I, p. 30.

²¹⁵ "L'impulsion ou la quantité de pression, communiquée à la touche doit être maintenue avec égalité: pour cela, le doigt ne doit pas se lever perpendiculairement de la touche, mais bien plutôt glisser doucement le long de cette touche, en se repliant graduellement vers la paume de la main." Jaëll, Marie. *La Musique et la Psychophysiologie*. Paris: Alcan, 1896. p. 21.

²¹⁶ "De même qu'un violoniste joue plusieurs notes en un seul coup d'archet, de même dans les enchaînements de notes les attaques successives des doigts doivent être réunies en un seul mouvement glissé de la main." Ibid p 29.

Even though the attack is quick, it should not produce so much sound that it determines the degree of pressure transmitted to the key from the fingers. Then, a *glissé* will control the duration of the sound and touch. Finally, the key will have to be lifted very slowly as the finger will terminate its *glissé* to slowly come back towards the palm of the hand.

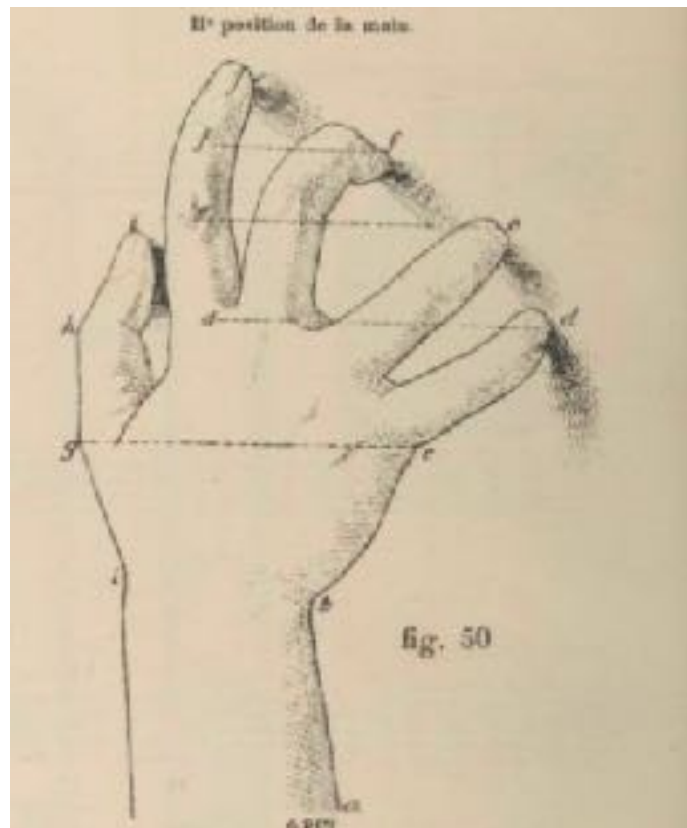
The second exercise below likewise focuses on sound emission between the thumb and the second finger. The general balance of the hand depends on the improvement of the sequence between the thumb and the second finger, so this exercise must be repeated until it has been completely refined.



Jaëll, Marie. *Le Toucher. Enseignement du piano basé sur la physiologie*, 3 volumes, Leipzig - Paris: Breitkopf-Härtel-Costallat, 1899. Vol. I, p. 30.

Afterwards, the third exercise will apply to the thumb, the second finger and the third finger, on a succession of three notes. The fourth exercise will add the fourth finger, on successions of four notes, and so on. The same process will then be repeated with the left hand alone and both hands together. It will afterwards be applied to repeated notes, intervals, black keys, chords, scales, and arpeggios.

The second part of exercises focuses on the succession of higher intervals and require diversifications of *glissés*. The hand position will also be slightly different in order to adjust to new degrees of flexions:



Jaëll, Marie. *Le Toucher: Enseignement du piano basé sur la physiologie*, 3 volumes, Leipzig - Paris: Breitkopf-Härtel-Costallat, 1899. Vol. I, p. 48.

According to this picture, the hand will have to incline more towards the fifth finger, the second finger will lengthen more, the thumb will have a slightly different angle, and the third, fourth and fifth finger will be proportionally flexed in order to form a curve (f-e-d).

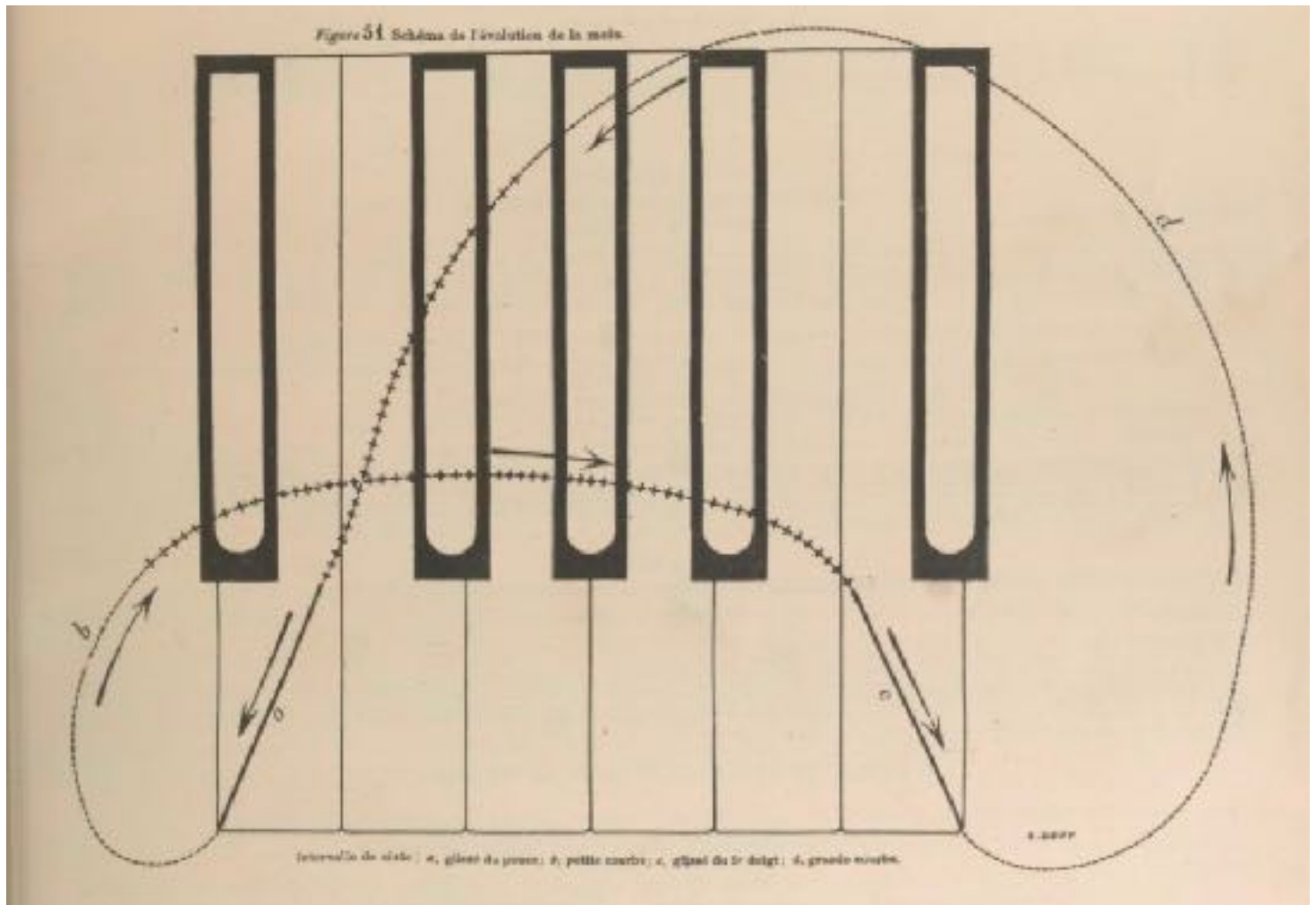
This set of exercises focuses on sixth, octaves, eleventh, and two octaves, using the thumb and the fifth finger, starting with the right hand.

The image displays four musical exercises for the right hand, each on a single staff in treble clef with a 2/4 time signature. The exercises are:

- 31^{me} EXERCICE.** ENCHAINEMENTS D'INTERVALLES DE SIXTES (pouce et 5^{me} doigt). *MAIN DROITE. très piano.*
- 32^{me} EXERCICE.** ENCHAINEMENTS D'INTERVALLES D'OCTAVES. (pouce et 5^{me} doigt). *MAIN DROITE. très piano.*
- 33^{me} EXERCICE.** ENCHAINEMENTS D'INTERVALLES DE DIXIÈMES. (pouce et 5^{me} doigt). *MAIN DROITE. très piano.*
- 34^{me} EXERCICE.** ENCHAINEMENTS D'INTERVALLES DE DEUX OCTAVES (pouce et 5^{me} doigt). *MAIN DROITE. très piano.*

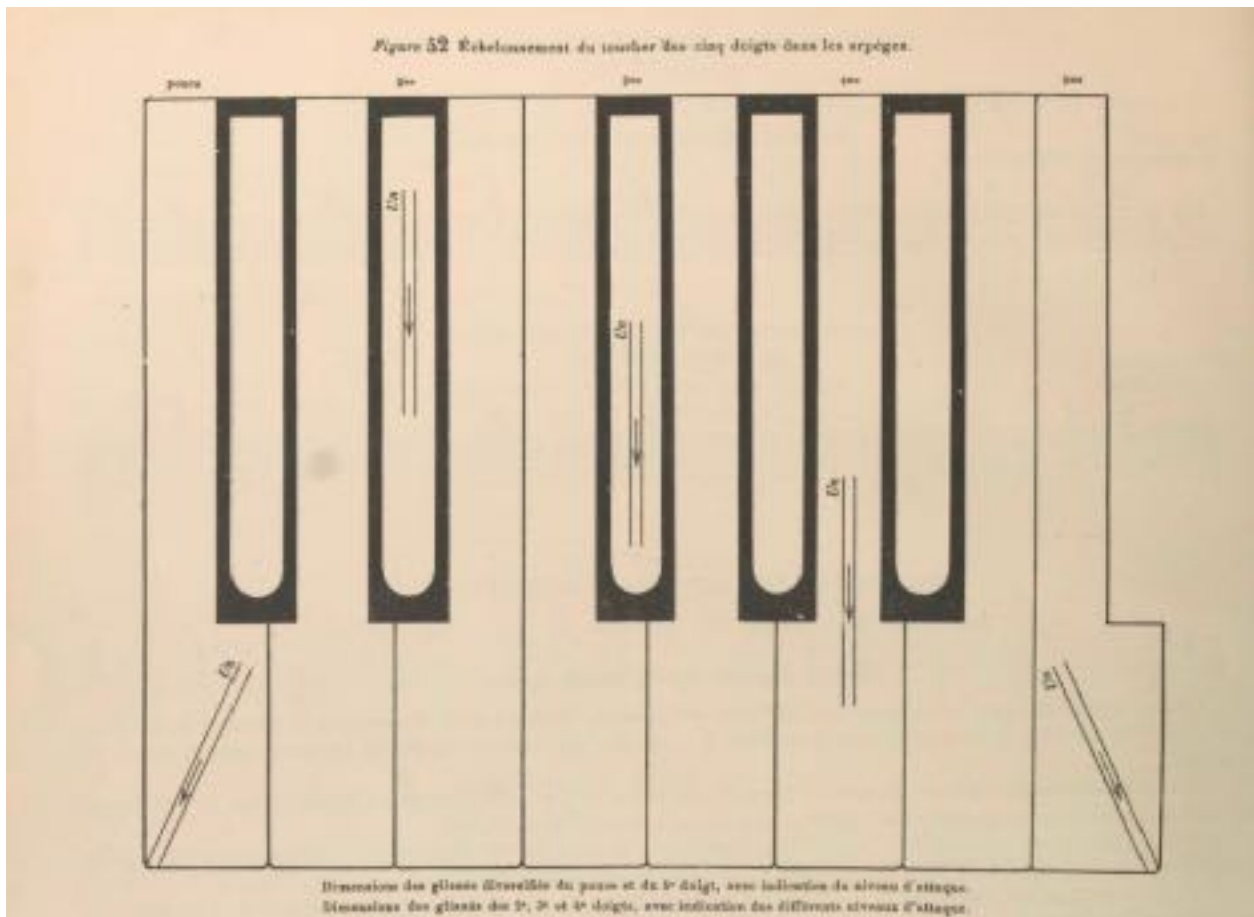
Jaëll, Marie. *Le Toucher. Enseignement du piano basé sur la physiologie*, 3 volumes, Leipzig - Paris: Breitkopf-Härtel-Costallat, 1899. Vol. I, p. 50.

The important interval distance generates a different type of *glissé*. The thumb's *glissé* extends from the back to the edge of the keyboard (a) and draws a diagonal towards the left while the fifth finger *glissé* (c) will draw a diagonal towards the right, as follows:



Jaëll, Marie. *Le Toucher. Enseignement du piano basé sur la physiologie*, 3 volumes, Leipzig - Paris: Breitkopf-Härtel-Costallat, 1899. Vol. I, p. 49.

This sketch shows the uninterrupted circular motion of the hand as playing a sixth interval. The movement will be similar for the higher intervals. But for arpeggios, the *glissés* will be more diverse and located in different regions of the keys, such as it is shown in the following example of a diminished arpeggiated chord:



Jaëll, Marie. *Le Toucher. Enseignement du piano basé sur la physiologie*, 3 volumes, Leipzig - Paris: Breitkopf-Härtel-Costallat, 1899. Vol. I, p. 52.

These sketches are mostly intended to describe the mental representation that should occur before the actual realization of the arpeggios. The circular motion of the hand and the sliding motions of the fingers are choreographed in the brain before their sonic realization; during this mental realization, the student should think without visibly acting.

On scales, Jaëll observes how the traditional practicing method creates erroneous relations of touches. Rather than training both hands together, the student must train each hand separately until they are perfectly familiar with the intervals, fingerings, and localization of

touches. For scales, the fingers' attacks are spaced out more narrowly; the thumb presses the key at its edge and the index stays in extension, elevating the hand towards the fifth finger through a rolled motion. Additionally, the traditional thumb crossing must be suppressed and groups of fingers will have to be connected by switching the hand instead.

Finally, the third type of exercises exclusively develop rolled motions — *roulés*, instead of *glissés*, particularly in the execution of full arpeggios. *Roulés* have to be only realized under the influence of the turning hand's motion and require a total fixed of attitude from the fingers. The thumb and the index finger will touch the key with the medium region of its finger pad and roll from right to left, while the fourth and fifth fingers will roll from right to left. If the localization of the finger pads is correct, the fingerprints should have the following aspect:



Jaëll, Marie. *Le Toucher. Enseignement du piano basé sur la physiologie*, 3 volumes, Leipzig - Paris: Breitkopf-Härtel-Costallat, 1899. Vol. I, p. 64.

The fingerprints' visual support chiefly exists as a way for the pianist to mentally represent the finger pads motion that should be involved in the touch. As with scales, arpeggios must be practiced and refined in each hand separately first, with the right touch pressure, before trying with both hands at the same time. Additionally, Jaëll cautions the student to never settle for the result acquired. If progresses are quick, expectations will change on a daily basis. In other words, *"finger strokes that were considered as good the day before will be insufficient on the following day. It is only when each effort is followed by a greater one that the practice becomes fruitful. And this result must be obtained thanks to a system of study where progress rationally corresponds to the amount of effort spent."*²¹⁷

In the next two volumes of *Le Toucher*, Jaëll applied the principles of touch expressed in her exercises to Piano repertoire. She used the same pieces as those compiled in the 1894 version of her method, with some new additions, including her own compositions for children. In order to provide an appreciation of her approach applied to the repertoire, the following songs are considered:

- Chanson Berçante by Marie Jaëll
- Bach Prelude in D major Well Tempered Clavier Book I
- Chopin Etude op. 10 no. 1

²¹⁷ *"Une recommandation constante à faire à l'élève, c'est de ne jamais se contenter du résultat acquis. Grâce à la rapidité des progrès, les résultats se modifient de jour en jour. Les attaques considérées comme bonnes la veille, sont insuffisantes le lendemain. C'est seulement quand chaque effort est suivi d'un plus grand effort, que l'étude fructifie, et ce résultat doit s'obtenir par un système d'étude où le progrès correspond rationnellement à l'effort dépensé."* Ibid, p. 30.

- Chanson Berçante, by Marie Jaëll²¹⁸

24

CHANSON BERÇANTE

à TROIS VINGTS

MARIE JAËLL

L'Étude

Une brève tension musculaire est en vigueur pendant toute la durée de l'étude. On compte 3 fois 3 doubles croches (ou 4 fois FA, RÉTT) par mesure. Cette subdivision des temps permet l'analyse tactuelle et d'acquiescer les représentations tactuelles et auditives.

Pour les glissés se conformer aux trajets pointillés fig. 15 (main droite et main gauche) on s'appliquera particulièrement à ce que, dans la main droite, les glissés du 2^e doigt ne soient pas écartés, et que la main ne soit pas inclinée du côté du 2^e pendant leur réalisation. Tous les glissés se feront par un doigt exclusivement. Pour l'étude des croches, le glissé ainsi que l'attention expectante exigée pendant les silences imposés pour l'isolement des octaves, auront la durée d'une double croche. Les croches durent dans la main droite au plus plus de deux croches, dans la main gauche au plus plus de quatre croches.

L'Exécution

(La tension musculaire est exigée tout pendant l'exécution)

Les touches de la main gauche se feront avec une sensibilité très élevée, on mettra toute la longueur de la stationette en contact avec les touches. La main droite sera jointe également à l'articulation des notes écrites et louches et des masses indiquées. Pour l'échappement des glissés, on se conformera aux trajets avec l'index fig. 15. On remarquera les petites dimensions du toucher de la croche main gauche (2^e 8-4). La pédale sera maintenue appuyée strictement pendant la durée des deux premières croches de chaque mesure. À l'articulation des masses finales et à une tonalité doit être prolongée et où le silence qui précède l'accord final doit être perçu pendant toute la durée du 2^e temps de l'accord-dernière mesure.

Doucement.

²¹⁸ Jaëll, Marie. *Le Toucher. Enseignement du piano basé sur la physiologie*, 3 volumes, Leipzig - Paris: Breitkopf-Härtel-Costallat, 1899. Vol. II p. 24.

Jaëll always instructed her students to meticulously subdivide the measure before they start playing. She noted that during the study of the touch, even the subdivision of the shortest notes' value should be duplicated. Because our traditional way of counting is a dilettante one: *"Indeed, it frequently happens that a student, counting for example four beats per measure while producing about twenty different fingers strokes, notices, despite their basic way of counting, some irregularities without having the wit to correct them. Especially if the student is already advanced, they will think that it is more artistic to play more or less incorrectly. This is a serious mistake, because these conditions generate musical deformities. Chance or unconsciousness cannot have anything in common with the artistic instinct, which is a mechanism that functions with perfection and an imperturbable logic, through refined and clairvoyant senses."*²¹⁹

In *Chanson Berçante*, Jaëll advises to count three sets of four sixteenth notes per measure, or six sets of two sixteenth notes. This subdivision allows one to isolate every attack and acquire tactile and auditive mental representations. She then presents a map showing the type of *glissés* that should be practiced for the first notes.²²⁰ The dotted lines represent the location of the attack and the dimension of the *glissés* that needs to be practiced. The arrows represent the location and dimension of the *glissés* for the proper performance of the piece.

²¹⁹ *"Ainsi, il arrive souvent que l'élève, en comptant par exemple, 4 temps, pendant qu'il réalise une vingtaine d'attaques, constate, malgré cette vérification sommaire de la valeur des notes, certaines irrégularités sans avoir l'idée de les rectifier; surtout s'il est déjà d'une certaine force, il s'imaginera qu'il est plus artistique de jouer plus ou moins incorrectement. C'est une grave erreur, dans ces donations on fait généralement des difformités musicales. Le hasard ou l'inconscience des ignorants ne peuvent rien avoir de commun avec l'instinct artistique qui est un mécanisme fonctionnant avec une perfection, une logique imperturbables, à travers des sens très affinés et clairvoyants."* Jaëll, Marie. *Le Toucher: Enseignement du piano basé sur la physiologie*. Leipzig - Paris: Breitkopf-Härtel-Costallat, 1899. Vol. 2 p. 2.

²²⁰ See figure 15. Ibid, p. 25.

The dotted lines represent the *glissés* for both right hand and left hand. The fifth finger *glissé* should not be shortened; neither should the hand lean towards the fifth finger during their realization. The left hand must touch the key with a vibrant sonority, and the distal phalange should be completely in contact with the key. The right hand should be played pianissimo, except for the half notes and the dynamics indicated. Finally, the pedal must only be maintained for the first five notes.

The guidance Jaëll gives regarding the direction and length of the touches can seem to restrict the performer's freedom, especially with the map regarding the directions of *glissés*. But they are only intended as a guiding hand helping the pianist to immerse themselves into the music through the right sonic and physiological entrance. This piece is excellent for young pianists who need to develop the perception of circular motion and sliding touch.

The following page illustrates the localization of the touches for Chanson Berçante. Jaëll encourages her students to first execute the maneuver of the sliding touch on paper before applying it on the keyboard.

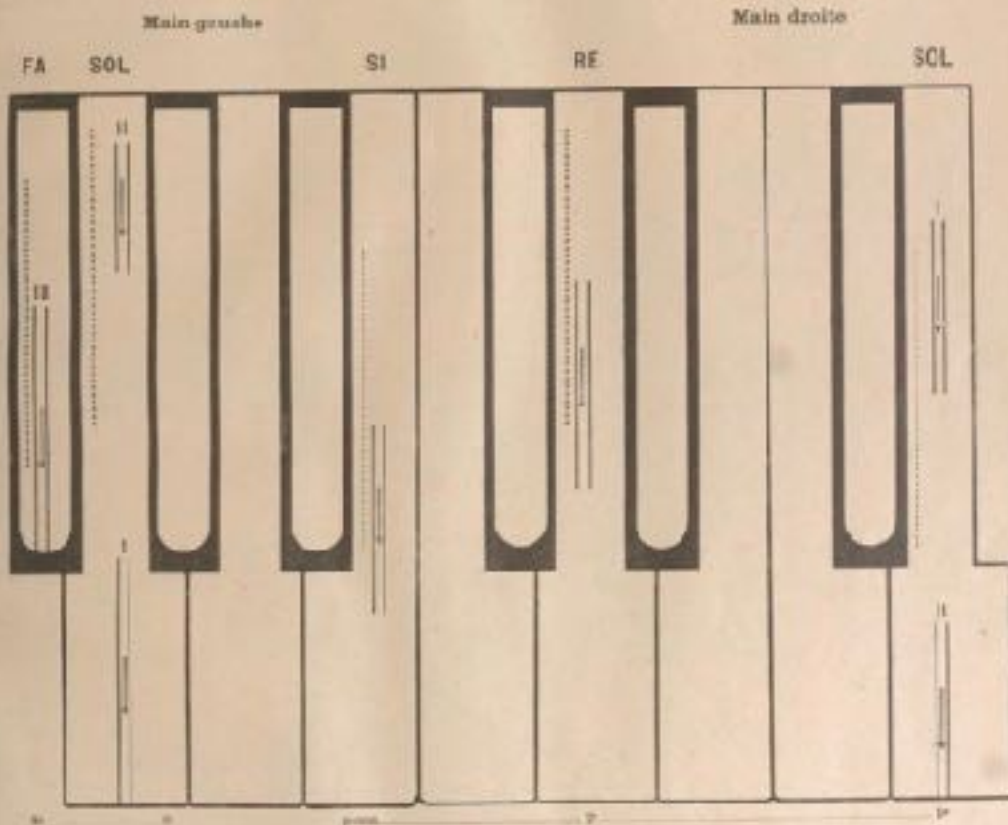
CHANSON BERÇANTE. — Modèles des Touchers

(L'élève doit réaliser ces glissés sur le papier avant de les exécuter sur les touches)

Grouperment des Touchers

Fig. 45. — Glissés à réaliser pour l'étude et l'exécution des trois premières notes.

Fig. 46. — Niveau d'attaque et dimensions des glissés à réaliser pour l'étude et l'exécution du premier groupe de quatre notes de la main droite.



Les trajets pointillés représentent le niveau d'attaque et les dimensions des glissés à réaliser pour l'étude.

Les trajets avec flèches représentent le niveau d'attaque et les dimensions des glissés à réaliser pour l'exécution lorsque pendant la durée des groupes de notes, la main est déplacée du bord vers le bord des touches en vue de réaliser ces glissés successifs des doigts en un seul glissé de la main.

Jaëll, Marie. *Le Toucher: Enseignement du piano basé sur la physiologie*, 3 volumes, Leipzig - Paris: Breitkopf-Härtel-Costalat, 1899. Vol. II p. 25.

- Bach D major Prelude, Well Tempered Clavier Book II²²¹

PRELUDE

J. S. BACH

L'Étude

Une forte tension musculaire est de rigueur pendant toute la durée de l'étude. On compte six tentatives à l'essai 8 triples croches (ou 16 fois FA, DCE) par mesure. Cette subdivision des temps permet d'isoler toutes les attaques et d'acquiescer les appréhensions mentales ou bien élastiques.

La corde les glissés sera d'une triple croche dans la main droite, d'une double croche dans la main gauche. La durée de l'attention spécialement sera avant chaque attaque, d'une triple croche pour la main droite, de trois doubles croches pour la main gauche. Dans la main droite, on veillera à ce que dans le groupement des touches, le pouce soit toujours placé au même niveau du clavier que le 7^e doigt (voir les exercices, pp. 23). Dans la main gauche, le glissé sera fait à la hâte par les doigts et par la main, qui trouvera un chemin de clavier des touches dont la durée est également valable à l'interception aigüe entre les attaques glissées. C'est-à-dire de trois doubles croches.

L'Exécution

(La tension musculaire est réglée avant pendant l'exécution.)

Les glissés conserveront la même longueur qu'à l'étude, mais on les fera d'autant plus rapidement qu'on veut jouer plus vite, ou que c'est la vitesse seule dans l'exécution d'un glissé isolé qui entre dans la succession des glissés. Au point de vue du développement du mécanisme des doigts, c'est là ce qui importe qu'il faut utiliser dans l'exécution. Ce préface et les quatre Préfaces suivants ont été écrits spécialement avec l'intention de favoriser des dispositions d'intervalle particulièrement favorables à ce genre d'exécution.

Le professeur devra toujours veiller à ce que, dans le groupement des touches de la main droite, le doigt du pouce reste toujours au même niveau que celui du 7^e doigt.

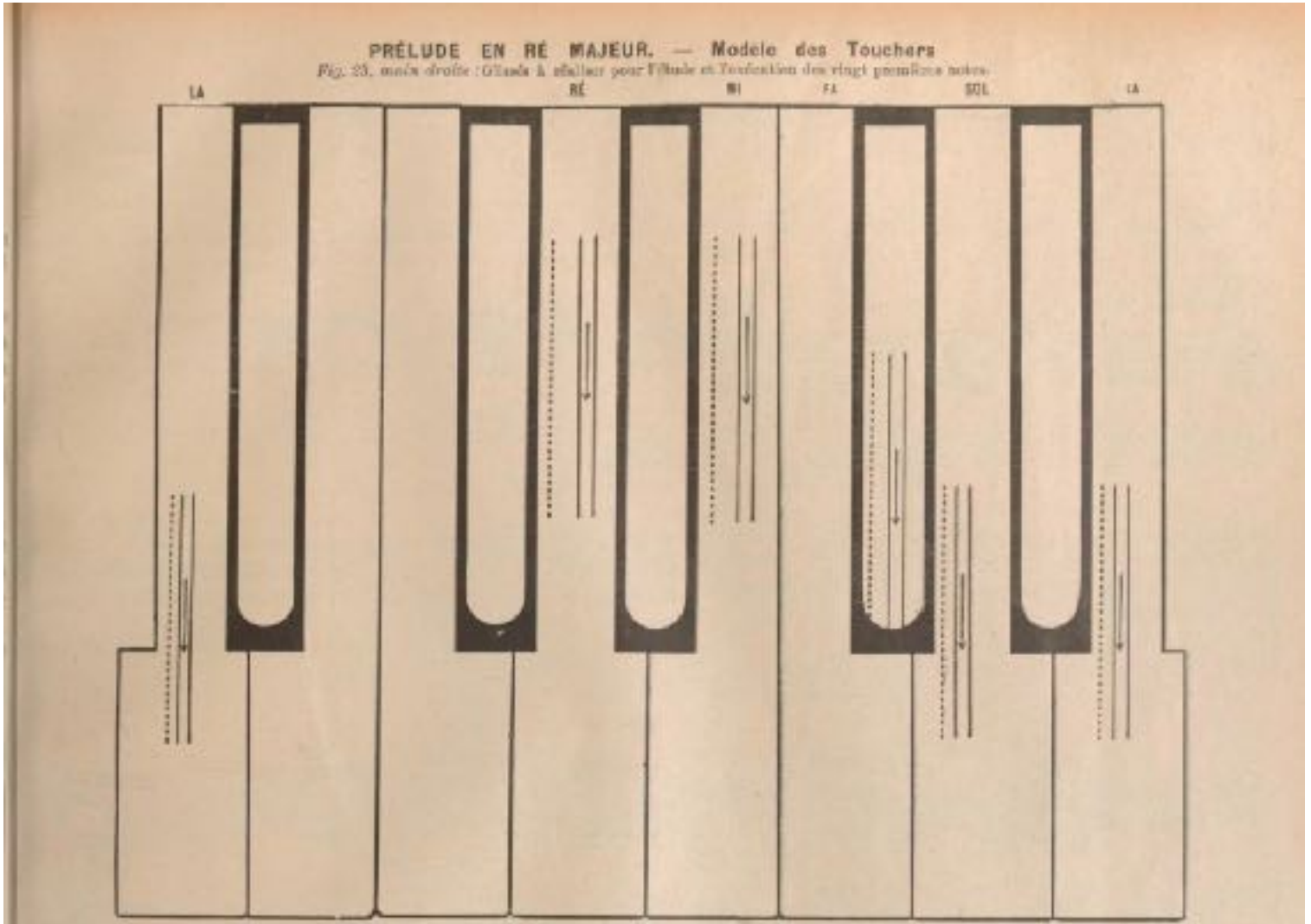
²²¹ Ibid p. 34.

It is interesting to observe how Jaëll approached this prelude, which is much less pianistic than *Chanson Berçante*. She likely chose this prelude with the intention to train the fingers with longer variety of intervals, at a faster speed, and to apply her touch principles to a different kind of keyboard technique.

For the subdivision, Jaëll recommends slowly counting four sets of eight thirty-second notes. This subdivision allows isolation of all the finger strokes and help to acquire a proper tactile and auditive mental representation. The duration of the *glissés* will be of one thirty-second note for the right hand, and one sixteenth note for the left hand. In the right hand, the thumb and the fifth finger's sliding contacts have to be at the same horizontal level — as illustrated in the following page. In the left hand, the *glissés* are both realized by the fingers and the hand. In other words, the hand will draw above the keyboard curves equivalent to the duration of the interruption required between each sliding touch — every three thirty-second notes.

Contrary to *Chanson Berçante*, the length of the *glissés* will remain the same during the practice time and the performance. But they will have to be realized faster in order to play the prelude at a proper speed. Thus, it is the speed acquired in the execution of a single *glissé* that will set in motion the succession of *glissés*.

Jaëll, Marie. *Le Toucher. Enseignement du piano basé sur la physiologie*, 3 volumes, Leipzig - Paris: Breitkopf-Härtel-Costallat, 1899. Vol. II p. 35.



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ANALYSE DU TOUCHER POUR L'EXÉCUTION DU MORCEAU

En jouant cette étude dans un mouvement rapide, il s'agit de presser les notes et les touches par groupe, c'est-à-dire presque simultanément de manière à ce que les représentations mentales des quatre touches et des quatre notes soient toujours en avance sur l'exécution des quatre touches et des quatre notes.

On se rendra compte de leur localisation et leur orientation, mais les groupes de touches seront classés en sensations fortes et faibles. Dans l'arpège montant les plus fortes sensations musculaires doivent correspondre à l'exécution des touches du 2^e, du 4^e et du 5^e doigt (COL. UT. M6); dans l'arpège descendant, elles doivent correspondre à l'exécution des touches du 4^e, du 2^e doigt et du pouce (UT. COL. UT).

Voici comment on attendra les différences de sensations et par conséquent de sonorité :

Les roules réflexes. — Les roules du 2^e doigt et du pouce doivent prendre une orientation double dont la première est réflexe, la seconde volontaire; c'est-à-dire que, sous l'influence de l'exécution rapide des doubles croches, l'orientation des roules du 2^e et du 4^e doigt doit, dans l'arpège montant, se communiquer aussi au roule du 5^e doigt, et l'orientation du roule du 1^{er} doigt doit, dans l'arpège descendant, se communiquer aussi au roule du pouce. Mais c'est précisément pendant la réalisation de cette orientation réflexe qu'on doit se représenter l'orientation inverse du roule du 2^e doigt et du 4^e doigt suivant, soit qu'il s'agisse du roule du 5^e doigt suivi du roule du pouce dans l'arpège montant, soit qu'il s'agisse du roule du pouce suivi du roule du 5^e doigt dans l'arpège descendant. Ces roules se retournent, comme on pourrait les appeler, ont un caractère spécial; ce roule est celui qui est l'impulsion acquise au roule réflexe qui fut communiqué une sonorité vibrante à la note correspondante, c'est au contraire la légèreté, l'élasticité acquise au roule et retour qui entraîne l'affaiblissement relatif de l'attaque du doigt suivant, et par conséquent l'affaiblissement relatif de la sonorité de la note suivante.

Mais malgré ces différences très nettes de pressions des touches, les impulsions fortes et les impulsions faibles ne correspondent à des sensations corrélatives tellement différentes que si les doigts qui réalisent les trois notes successives, dont le dernier est réflexe, maintiennent les trois touches presque simultanément enfoncées pour les laisser ensuite graduellement se relever. C'est l'articulation réelle des sensations suivies du relèvement graduel des doigts qui entraîne dans une large part à l'exécution des sensations. Ne pas confondre cette prolongation volontaire des sensations du toucher avec la pression des doigts qui involontairement ne se relèvent pas des touches. Il s'agit ici non pas d'une incorporation, mais d'un perfectionnement conscient du toucher, car la prolongation des touches multiplie les sensations et le relèvement retardé des doigts exige dans son déclenchement un contrôle bien plus précis que le relèvement non retardé.

Il est à remarquer qu'au dehors de ce classement en sensations fortes et faibles, les phénomènes du toucher de cette étude doivent entraîner la particularité suivante: l'exécutant doit éprouver dans l'exécution les arpèges montants (2^e, 4^e et 5^e doigts) des sensations complètement différentes de celles éprouvées dans l'exécution de l'arpège descendant (2^e, 4^e et 5^e doigts et pouce), en raison de la différence d'orientation des pressions qui modifie le caractère du timbre de la sonorité. Cette différence d'orientation des pressions entraîne les différences de sensations qui semblent à la fois si distinctes et si liées qu'on pourrait les comparer aux phénomènes des couleurs complémentaires. Mais il faut bien connaître et savoir utiliser le domaine de la sensibilité des palpés pour atteindre une cohésion de sensibilité capable d'éveiller ces images complémentaires.

The image shows three systems of musical notation for Chopin's Etude Op. 10 No. 1. Each system consists of a piano (left) and right-hand (right) staff. The tempo is marked 'Allegretto'. The first system includes a 'p' dynamic marking and fingerings 1, 2, 3, 4, 5 for the right hand and 5, 4, 3, 2, 1 for the left hand. The second system includes a 'p' dynamic marking and fingerings 1, 2, 3, 4, 5 for the right hand and 5, 4, 3, 2, 1 for the left hand. The third system includes a 'p' dynamic marking and fingerings 1, 2, 3, 4, 5 for the right hand and 5, 4, 3, 2, 1 for the left hand. There are asterisks and 'Ped.' markings throughout the score.

In order to play this Etude at a fast tempo, notes and types of touches must be thought of as groups; in this case, groups of four notes. The mental representation of these groups must always be ahead of the actual execution. Here, touches do not have different localizations or orientations on the keyboard, but Jaëll nevertheless classifies them in weak and strong sensations. As the arpeggio goes up, the strongest muscular sensations must be in the second finger, fourth finger, fifth finger (on G, C, E). In the descending arpeggios, they must be in the fourth finger, second finger and thumb (on C, G, C). In this piece, *roulés réflexes* will allow to attain difference of sensations and sound, at a high speed.

Jaëll describes how the fifth finger's *roulés* have a double orientation, both reflexive and voluntary. In other words, the fifth finger's *roulés* are the consequence of the second and fourth fingers *roulés* in the ascending arpeggio, as reflex. In the descending arpeggio, they are voluntary. The different orientation of the fourth finger and second finger *roulés* must be communicated to the *roulé* of the thumb. Pianist must always be ahead in their mind, in such a way that the orientation of the *roulés* will have to be anticipated. In the descending arpeggios, the mental representation of the ascending *roulés* must already be prepared. The fingers realizing the three *roulés* will have to simultaneously maintain the keys down, and gradually lift them. The unification of sensations combined with the gradual lifting of fingers will contribute to an accumulation of sensations. But these sensations should not be mistaken with lazy fingers that do not lift the keys. In this case, prolonging the touch is a conscious refinement that allows one to multiply tactile sensations.

In both the ascending and descending arpeggios, the different orientations of finger pad's pressures change the character of the timbre. In order to illustrate these orientations, Jaëll uses fingerprints instead of dotted lines as a guiding support, as in the context the touch is a *roulé*.

In the ascending arpeggio:

- The thumb will realize a *roulé* going from the medium region to the inferior region of its finger pad.
- The index's finger pad will roll from the most sensible region to the medium one.
- The fourth finger will roll from the most sensible region to the opposite one.
- The fifth finger will roll from the least sensible region to the medium one.

In the descending arpeggio, the same finger pads regions will be used, but all orientation occurs in the opposite directions.

The practice guidance Jaëll gives is intended to inspire pianists to continue the work on their own, by perfecting their hand compass and mental capacities. Jaëll always reminded that it is first necessary to refine the finger pads' sensibility to develop a cohesion of sensations before perfecting visual, sonic and tactile perceptions through the music.

Les rapports des touchers établis par le groupement
des quatre empreintes, fig. 40.

*(Ce que nous appelons les harmoniques
du groupement de la position des doigts.)*

Fig. 40.



Jaëll, Marie. Le Toucher. Enseignement du piano basé sur la physiologie, 3 volumes, Leipzig - Paris: Breitkopf-Härtel-Costallat, 1899. Vol. III, p. 22.

F. CONCLUSION

Jaëll's work takes us into several different artistic, philosophical and scientific spheres. But even though Jaëll frequently extends herself beyond the musical and artistic disciplines, it is only so that she may better understand music's essence. She was a musician who could not approach a particular problem without exploring universal laws. As reflected in her workbooks, Jaëll thought that each day had the potential to open up infinite possibilities, and her in-depth work, at the service of her art, chronicles her remarkable journey. She accomplished an influential career for herself and achieved a recognition as an artist, composer, teacher, and researcher. Despite a life of political and personal disruptions, Jaëll always kept pursuing her artistic ideal with higher and higher personal demands, with an extraordinary and inspiring work ethic.

At the apogee of her musical career, Jaëll took a sudden turn from the Parisian social life to devote herself to understanding the mechanism of the musical thinking through the touch, realizing that musical intuition needed a physiological basis to develop to its full potential. It is in solitude that Jaëll dedicated the last three decades of her life to exploring the making of the sound, and to identifying the ways in which rhythms of the tactile, sensitive, auditive sensations combine themselves to become music itself. Jaëll realized that our hand is a functional exteriorization of our brain, a compass that connects us to the sensible world of sounds and which has enormous potential to be refined.

In the final years of her life, Jaëll realized that the tenacity and focus she exhibited for years in solitude, while responsible for amazing insights, ultimately limited the reach of her

discoveries. Jaëll regretted that, in her fervor and studious dedication, she had neglected the diffusion and public distribution of her work, as reflected in a late letter to a student: *"Certainly, I have found musical truths that can illuminate the path upon which one should embark, towards a greater intensification of our manual and mental faculties. But how to increase the number of people who want to follow it? Here too, I need help and advice. I don't know how to make known, how to propagate, the new strengths that I am so happy to share. Thus, by addressing you my gratitude, I am also expressing to you all my distress regarding the necessity to broadcast the work while I can still serve as a living connection. The idea that I should leave this world without having the certitude that all my findings will be exemplified by the future and happier generations is of course frightening... I wanted to work for others. My music must survive me in your spirits and in your fingers."*²²³

Jaëll's call for greater communication of her discoveries did not go wholly unanswered. After Jaëll's death, a group of students gathered together in Paris in order to help with the diffusion of her work, primarily comprised of of Madame André Heu, Madame Jacques Weiss-Bergner and Eduardo Del Pueyo. Marie Jaëll's association also opened in 1957 in Paris, and developed centers in Lyon and Strasbourg; this association trains teachers and aims to make Jaëll's life and work more well-known across Europe. Unfortunately, despite these efforts, Jaëll's contribution remains relatively obscure, mostly because of the complexity and density of her

²²³ *"Certes, j'ai trouvé des vérités musicales qui éclairent la voie dans laquelle il faut marcher vers une intensification de plus en plus grande de nos facultés manuelles et mentales. Mais comment accroître le nombre de ceux qui veulent la suivre? Là aussi j'aurais besoin d'aide et de conseils. Je ne sais comment faire connaître, propager, les forces neuves que je suis si heureuse d'apporter. Donc, en vous disant ma reconnaissance, je vous dis aussi toute ma détresse au sujet de la nécessité de diffuser l'oeuvre pendant que je puis encore servir de lien vivant. L'idée que je devrais m'en aller de ce monde sans être sûre que tout ce que j'ai trouvé s'incarnera dans les générations futures, qui seront plus heureuses, est bien angoissante... J'ai voulu travailler pour les autres. Il faut que ma musique me survive dans vos esprits et dans vos doigts."* Kiener, Hélène. *Marie Jaëll, 1846-1925; Problèmes D'esthétique Et De Pédagogie Musicales*. Bibliothèque D'esthétique. Paris: Flammarion, 1952. p. 106.

work, which requires a patient and attentive immersion. However, thanks to the current era of easier digital distribution and information sharing, different type of teaching with more emphasis on physiological functions has started to emerge, and Jaëll's works may be more easily discovered and distributed.

Jaëll's findings remain unique in the way her approach helps the student become an independent creator using their own mental and physiological resources. By developing precision of the touch, tactile and auditive senses, and a timbre that reflects these qualities at a high level, students can immediately plunge into the music and learn how to sculpt the sound with their hands, the sensible externalization of their brain. Jaëll's work is in many regards much more subtle, rich and fertile regarding the consequences on music in the long term than most commonly-taught methods. While many types of teaching are flattering and standardize a variety of talents, or emphasize the ludic aspect in an overly extreme way without any musical and physiological structure, Jaëll saw the physiological potential in everyone capable of an effort of will.

There are certainly some challenges in transposing Jaëll's approach to our modern culture, which is marked by demand of immediacy and an over-reliance on technology, often at the expense of one's own mental and physiological faculties. Fingers that are playing on a keyboard without any focus are, in this sense, quite representative of one of our society's symptoms: people who stubbornly repeat mindless patterns that are disconnected from their thinking and actions.

Jaëll showed that the hands must be both an expansion and an independent source of the artist's musical thinking. In other words, rather than being a passive extension of the brain, the

hands can open up new worlds of perception and act as a compass to a better musical understanding. To that extent, scholars of musical pedagogy, performers, teachers should familiarize themselves with Jaëll's contributions so as to continue her quest to employ cross-disciplinary methods to reach new artistic levels.

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