Historical Vignette: 
Louis Émile Javal (1839–1907): 
The Father of Orthoptics


INTRODUCTION

Louis Émile Javal was a pioneer in the early history of orthoptics (Figure 1). To anyone knowledgeable about binocular vision, the name Javal conjures up discussions of physiological diplopia, stereoscopes, and fusion training exercises. Javal was a prolific designer of optical devices to use in orthoptic training and ushered in a new era of binocular instrumentation.1–4

Although Wheatstone is accredited with designing the first stereoscope, Javal was an admirer of the instrument and later designed his own version.1,3 He has often been called the Father of Orthoptics.1, 4, 5 He was influenced by his family’s history of strabismus. The Javal grid is an instrument of historic interest to most orthoptists, and the principle on which it is based is still in common use (Figure 2). He wrote his Manual of Strabismus in 1896.6

Javal was also well known in general ophthalmology circles for his interest in intraocular pressure and keratometry. He developed several instruments such as the Javal-Schiøtz ophthalmometer. His refraction technique combined the use of a retinoscope with a keratometer. Javal had a particular interest in astigmatism, perhaps in part because of his own refractive error.7, 8

In an ironic twist of fate, he lost his vision in later life from glaucoma and became an advocate for blind people, even writing a book discussing practical adaptation to blindness. He was also an enthusiastic disciple of Esperanto and encouraged blind

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® 2007 Board of Regents of the University of Wisconsin System, American Orthoptic Journal, Volume 57, 2007, ISSN 0065-955X, E-ISSN 1553-4448

people to learn to speak it. He died one hundred years ago in Paris.

FAMILY BACKGROUND

Louis Émile Javal, known as Émile to his friends and family, was born in Paris on May 9, 1839. He was the oldest of six children. His parents were Léopold Javal, a successful and influential banker and industrialist, and Augusta von Laemmel, an Austrian of noble birth.

Javal came from a wealthy Jewish family originally from Seppois-le-Bas in the upper Rhine region near the German border. In 1808, when a Napoleonic decree obliged the Jews to take a patronym, his great-great-grandfather Herschel Jacob, a trader, changed his name to Jacques Javal. His son of the same name (born in 1780 with strabismus) was known as Jacques the younger and founded a textile factory in 1819 employing more than five hundred workmen. His business endeavors also included establishing a bank in Saint-Denis, close to Paris, building a successful spinning mill after importing modern English textile machinery, providing arms for a trading ship, and creating the railway line from Strasbourg to Basle in 1827, the first in France.5

One of Jacque’s sons was Léopold Javal (1804–1872) who was a volunteer fighter in Algeria, later becoming an officer. He moved to Paris where he became a successful industrialist. He built railway trains, public baths, and department stores, and invested in coal mines in Provence. He became an elected official of his local district and was re-elected many times. He supported legislation to further state education, human rights, and the fall of the Emperor.

Léopold, who was to become Émile’s father, married Augusta von Laemmell (1817–1893) who came from Austrian nobility. Her grandfather was elevated to the peerage by the Emperor François II of Austria in 1812 for producing weapons for the Austrian army. Augusta’s father Leopold von Laemmel founded the Savings Bank of Prague, the Creditanstalt Austrian (a famous bank in Vienna), and a Bohemian railroad company. Her mother was a baroness whose brothers were the bankers of the King of Bavaria!

Louis Émile Javal married Maria Ellis-sen in 1867. Her mother came from a wealthy family of bankers in Frankfurt. They had five children, the oldest of whom was Jeanne-Félicie, who married Paul Louis Weiss, a fellow mining engineer. Her siblings and their spouses were all highly successful during their lifetimes, although two died in Auschwitz in 1944. Jeanne’s daughter (Émile’s granddaughter) Louise Weiss became an internationally renowned journalist, feminist and supporter of voting rights for women. She was well known for her publications discussing life in France after the war, and her relationship with her famous grandfather. 5

JAVAL FAMILY OCULAR HISTORY

The Javals had a family history of stra-bismus. Although Javal himself did not

have any ocular misalignment, his grandfather, father, sister, and nephew and niece did. He had a high degree of astigmatism, as well as chronic conjunctivitis and heterochromia. His father had an esotropia and underwent strabismus surgery by Desmarres. The disastrous outcome of a large consecutive exodeviation affected Javal, who described the technique as a “massacre of the medial rectus muscles.”

His younger sister Sophie became similarly afflicted, and Javal was relieved that her physician treated her with occlusion, prisms, and distance fixation exercises resulting in an alternating deviation. When Sophie was eight years old and Javal was already a college graduate, he decided to treat her with a stereoscope. Supposedly, binocular vision was achieved after six months of therapy, although a couple of years later she did undergo strabismus surgery performed by Albrecht von Graefe, who knew Javal well.

EARLY CAREER

Javal attended Bonaparte College (later Condorcet College) in Paris and entered the School of Mines in Paris in 1859 to study engineering, as his parents hoped he would take over the family coal mining interests (Figure 3). Javal still found time to pursue his interest in physiological optics. One of his hobbies included translating ophthalmology texts by authors such as Helmholtz and Donders into French. He graduated with a degree in civil engineering in 1863 and worked for a year at the mines in Herault. He was an active member of the League of Teaching and wrote about the physiology of reading and writing.

His own ophthalmic problems and his family history of strabismus soon attracted him to the profession of medicine and the field of ophthalmology. He began his medical education at the University of Paris in 1865, and even as a medical student found time to write articles on astigmatism and orthoptics, and to design and write about various instruments. He graduated in 1868 and left for Berlin where he studied with Albrecht von Graefe. Returning to Paris from Berlin in 1870, he was called to serve as a medical officer in the short-lived Franco-Prussian war.

In addition to his outstanding contributions to ophthalmology, Javal was concerned with the social reform issues affect-
ing the community in which he lived. He followed his father into politics, being elected to serve as a congressman representing the local people, a position he held for about twenty years. A law he supported proposing tax cuts for large families became the Javal Law.

ACADEMIC ACHIEVEMENTS

Javal's doctoral thesis, written in 1868, was called “Du strabisme dans ses applications à la théorie de la vision,” which translates to mean he was writing about strabismus and its application to the theory of vision.9

In 1878, Javal became the first director of the Laboratory of Ophthalmology at the Sorbonne, University of Paris. Two of his students were Hjalmar Schiøtz and Marius Tscherning. He collaborated with Schiøtz to create the Javal-Schiøtz ophthalmometer and with Tscherning in research on optics, especially astigmatism.2 He was elected to the Académie de Médecine in 1885.

Javal wrote several books and was a prolific author of scientific articles, mostly in the Annales d'oculistique.6–9 His bibliography in that journal extends over six pages.7 He wrote his textbook on strabismus (Manuel du Strabisme), based on his doctoral thesis, in 1896.6,9 In 1907 he was invited to give the prestigious Bowman Lecture at the Ophthalmological Society of the United Kingdom, but died a few months before the event.

RESEARCH INTERESTS IN OPHTHALMOLOGY

Javal was greatly interested in strabismus, but also in astigmatism and keratometry. He worked closely with Schiøtz and they modified the Helmholtz keratometer for use in their ophthalmology laboratory at the Sorbonne. Javal recognized that amblyopia could be the result and not necessarily the cause of strabismus. He knew that hyperopia, anisometropia, and astigmatism influenced strabismus. He was aware of the concept of suppression (then called neutralization) and used occlusion to break up suppression and reintroduce diplopia.4 This was considered desirable if fusion training exercises were to be given. He also used ophthalmic pharmaceutical agents in his treatment of strabismus, using atropine to penalize the fixating eye in strabismic amblyopia, and miotics in the treatment of esotropia.2

Another interesting technique Javal employed was the use of a semitransparent occluder during cover testing to observe eye movements. This has been reintroduced in modern clinics as the Spielmann occluder.10

Javal's fascination with stereoscopes began with the Brewster and Wheatstone versions. He later designed his own modification of the Wheatstone stereoscope by adding hinges and a variable angle between the mirrors. He also experimented with a collapsible version.1,5

His interest in physiological optics resulted in the design of various instruments. His Contrôleur Multiple, also known as the Javal grid, was a device based on the principle of physiological diplopia and bar reading (Figure 2).1,4,6 He also designed the stéréoscope à 5 mouvements, a precursor of the Synoptophore.5

JAVAL’S TREATMENT METHODS

Javal’s determination that fusion could be restored by visual exercises resulted in lengthy therapy sessions with patients exercising for hours on a regular basis and these sessions were repeated mercilessly for years.

There is a touching letter written by Javal to a young patient to encourage her to pursue her eye exercises. Javal wrote:

“My dear little girl, you must quickly give back to your pretty little eyes the
ability to see together rather than have to wear a black band that hides one. This is a matter of will. One must work very hard during the short time at the stereoscope so that the progress made during the work is not lost during a long rest, and this inevitably happens if one rests too much. Only the strictly necessary rest, all rest beyond that is harmful. Personally, I used to work from 14–18 hours, which would be a little too much for you who need a little more sleep, but we could very well demand 12 hours, at least 10; you must not be afraid of getting tired. Success is gained only at that price. With a good teacher, such as Dr. Javal, you cannot but succeed, but it requires work, a lot of work, and in little time. Goodbye, my dear little fellow-patient, and I hope you will soon be cured. I encourage you to keep in good health.”

Javal was so enthusiastic about his methods that he taught them to many colleagues, including Valentine Remy and Marius Tscherning. Visiting from Birmingham, England, in 1898, Priestly Smith observed Javal’s methods and instruments and concluded that there were three aspects of therapy to be considered in the treatment of strabismus: optical, surgical (operative), and orthoptic. The same holds true today.4

The same year, John Green, an ophthalmologist from St. Louis, Missouri, designed a set of stereogram cards, one of which depicted a 3-D weathervane. Javal adopted it in his own set of ten cards.4 It is not known if the two inventors met, or just had similar interests. [Interesting aside (or odd coincidence): this author was born in Birmingham and now lives in St. Louis!]

When von Graefe visited Javal at the time of Sophie’s surgery, he expressed interest in observing Javal’s methods. Javal explained what was involved and discussed the many methods in vogue at the time and then asked von Graefe what he thought. Von Graefe dampened Javal’s enthusiasm by replying, “people are really not worthy of all that trouble.” It was many years later before Javal reluctantly agreed with him!

LATER YEARS

Sadly, Javal developed glaucoma in his right eye at the age of 45. He underwent unsuccessful surgery in 1885, eventually losing vision in that eye four years later. The leading expert in glaucoma at the time was his old colleague Priestly Smith from England. An uncomplicated iridectomy was performed but did not help, and Javal lost all vision by the age of 62.

In 1935, Alfred Loewy wrote Blinde Grosse Männer, a short book containing biographies of eleven famous people who had lost their sight yet continued to be productive despite their handicap. Along with Javal, some of the others whose lives are described in the book include Georg Friedrich Handel, John Milton, and Henry Fawcett, the general postmaster of England.11

Javal was blind for the last seven years of his life. He accepted his blindness with patience and became an advocate for blind people. In 1903 he wrote a book called Entre Aveugles (Among the Blind) containing counseling advice and describing various devices and inventions to alleviate the difficulties of people with visual handicaps.12 This was one of many endeavors achieved after he went blind. He was a friend of Ludovic Zamenhof, an ophthalmologist from Bialystock, Poland, who trained in Vienna. Zamenhof spoke multiple languages and was the originator of Esperanto. (He signed his first article on the concept as Dr. Esperanto, or Dr. Hopeful!) Javal became a fluent speaker and promoter of Esperanto, believing this was a way to teach international linguistic communication and also an important asset for blind people.

Javal died of stomach cancer on January
29, 1907. He had asked to be cremated, except for one eye; he had promised his left eye to Priestly Smith. It was enucleated by Tscherning and sent to Priestly Smith in Birmingham. Javal was a humble man, a productive scientist, and a generous humanitarian.

REFERENCES


Web Site sources: www.whonamedit.com

Key words: Louis Émile Javal, Javal grid, Contrôleur Multiple, stereoscopes, strabismus, fusion, fusion training, physiological optics, Esperanto, famous blind people