Maximilian PLESSNER, *Ein Blick auf die grossen Erfindungen des zwanzigsten Jahrhunderts. I. Die Zukunft des elektrischen Fernsehens.*

Ferd. Dämmlers Verlagsbuchhanndlung, Berlin, 1892.[1893]

Translation, abstracts and comments by Nils Klevjer AAS

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The brochure *Ein Blick auf die grossen Erfindungen des zwanzigsten Jahrhunderts: I. Die Zukunft des elektrischen Fernsehens*, published in 1893 by Maximilan Plessner, Captain (ret.) in the Royal Prussian Army, is one of the most unknown documents of the early history of television. It has never been quoted in the recent literature on this period, and after two years of research André Lange has identified only one existing copy in the Österreichische Zentralbibliothek für Physik_(Wien). Only two quotations of the brochure are known, and both dated from 1898: in "Jan Szczepanik und Maximilian Plessner. Der Erfinder des Telektroskops und sein Vorläufer", *Vom Fels zum Meer*, Stuttgart, Mai 1898, pp. 160-165, and in B. SCHÖFFLER, *Die Phototelegraphie und das elektrische Fernsehen*, W. Braumüller, Wien, 1898, p. 27. Although Plessner's contribution to the history of television can be considered as minimal, this brochure is of great interest, as demonstrated by Nils Klevjer Aas' abstract and comments.

The originality of this contribution is less on the technical proposal – Plessner is only one of the many since 1878 proposing an apparatus based on the selenium properties – than in its insights on the interest for television and its views on the possible social uses of such a technology. The hyaloscope suggested by Plessner to record events (such as the celebration of the victory of the Prussian Army over France) is probably the first insight of what will be called half a century latter the videocassette recorder (VCR) or magnetoscope. With his exemple of the possible recording of the 1870 parade of the victorious Prussian Army, Plessner also anticipate the propaganda use of film and television. Its considerations on the probable demographic effects of television were probably to optimistic but not without interest. And the final addendum by Plessner about Edison's kinetograph makes this brochure the first text where the parallel progress of cinema and television are confronted, even if in a very brief manner.

As underlined by Nils Klevjer Aas' reading of the brochure, the document is also interresting as a testimonial of the deluded and frustrated "inventor", probably autodidact but convinced of the decisive aspect of its own contribution. In this sense, the Plessner's brochure is of the same nature as the one of his predecessors, Adriano de Paiva's *La télecopie électrique basée sur l'emploi du sélénium* (1880) and *Le télectroscope* (1881) by Constantin Senlecq and also announce the Mark Twain article "The Austrian Edison Keeping School Again" (1898) in defence of the Polish inventor Jan Szczepanik.

A.L.

A Glance at the Great Inventions of the 20th Century

By Maximilian Plessner, Captain (ret.) in the Royal Prussian Army

I. The Future of the Electrical Television
Ferd[inand]Dümmlers Verlagsbuchhandlung, Berlin 1892 [1893][1]

Foreword and Introduction

"When I made the decision to bring the results of my years of studies in the field of synthesising heuristics to publication, and to put them at the disposal of creatively disposed persons of the coming century in the form of utilisable material, I had to take into consideration the fact that inventors are not exclusively recruited from the ranks of studied and trained professionals, but from members of all occupations and social strata. I had to bear in mind that in their ranks are marching, arm in arm, high and low, rich and poor, the educated and the untrained, and that among them there are not a few laymen who have attained fame and who may attribute their first inspiration for their later creativity to the reading of popular[ised] scientific works, whose animating content fed the slumbering embers of their inventive capacities into full flame".

With these words Maximilian Plessner opens the Foreword to his pamphlet *A Glance at the Great Inventions of the Twentieth Century*. Through this Foreword, and a more extensive Introduction, the author goes to great lengths to promote and justify his project. Plessner's stated aim is to "introduce to talented inventors a promising field of mental material, consisting both of raw material and semi-processed goods, which is ripe [for development into] ready-for-use inventions, both as an independently commercial undertaking, as well as in fruitful co-operation with capital owners" (Introduction, p. 9).

The pamphlet is apparently conceived as a combination of the classical do-it-yourself self-improvement guide ("One Hundred Surefire Ways to Become Rich Quick", etc.) and of the equally classical desk-bound canvassing exercise of synthesised discussions of scientific findings. Plessner never acknowledges his true motives for writing (which would definitely seem to lie beyond the florid altruistic rhetoric he intermittently throws up). Expressly, however, he sets himself the task of enlightening his readers by identifying new inventions that mankind seems desperately to need, and which therefore will make their inventor not only famous, but also extremely rich.

"Experience" leads Plessner to argue that "those inventions that lead to perfection in communications are of the greatest economic importance", as they "exert a positive influence on trade and competition, and provide employment for numberless labour-willing hands" (Introduction, p. 10). In Plessner's analysis there are two projects that qualify as "unquestionably the most important tasks for the new century": Finding the solutions to the problems related to the "dynamic [i.e. independent of wind, 'dirigible'] aircraft shipping"[2] (in modern terms, the 'airline industry'), and to the "electrical television"[3] (Introduction, p. 11).

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[1] The date 1892 appears on the cover of the brochure, but, as it will be argued, the real publication was probably early 1893.

[2] In Plessner's term: "dynamischer Luftschifffahrt". It is interresting to note that some of the most famous contributors to the early years of research on transmission of pictures (Constantin Senlecq, Paul Nipkow, Lazare Weiller) were also involved in the development of the aeronautic. The same can be said of Graham Bell himself and

While Plessner mainly devotes the Foreword to explain that he is indeed writing for the interested layman – and to offer profuse apologies to the learned and the professionals – his main emphasis in the Introduction is on practical advice addressed to those enthusiasts who may seek the solution to the technical challenges offered: In their enthusiastic pursuit of new inventions and discoveries, they must not overlook the need to protect the products of their mental efforts through patents, otherwise mighty capitalist forces may rob them of their just rewards. The true inventor, moreover, is someone who "focuses his attention on the discovery of those gaps [by way of products or processes] which exist in the current production of goods" (Introduction, p. 5) and then aims to fill such gaps with new inventions.

Plessner inscribes his writings in this pursuit – it is a "source text, which inventors and manufacturers may consult in the pursuit of identifying the[se] gaps" (Introduction, p. 5-6). As for those engaged "not in business speculations, but in scientific pursuit as an aim in itself", they may be served by the text as a means of avoiding "inventing objects … that [turn out to be] worthless things" (Introduction, p. 6). But at the same time he is careful to underline that he is merely offering "mental material in the form of ideas, raw materials and semi-processed notions, that the talented inventor may turn into ready-for-use objects" (Introduction, p. 9). And should the work of the inventors not produce the desired results and objects, Plessner consoles his readers that "in the efforts to solve the[se] problems[s] a number of valuable ancillary inventions may be expected to be made" (Introduction, p. 11).

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of Clement Ader, the inventor of the *théâtrophone*. Albert Robida's novel, *Le vingtième siècle* also illustrates this simultaneity of interests.

[3] Plessner consistently refers to television with the adjective "electrical" attached, and – equally consistently - he uses the German word which is still current for (and a literal translation of) 'television' – "das Fernsehen". The first occurence of the "elektrisches Fernsehens" is to be found in LIESEGANG, R.E. , *Beiträge zum Problem des electrischen Fernsehens. Probleme der Gegenwart*, Band 1. Liesegang Verlag, Düsseldorf, 1891. It seems obvious that Plessner was aware of Liesegang's book with which he shares a philosophical approach of the technological research.

The Future of the Electrical Television

First Section:
Evaluation of the Instruments Needed to Make the Electrical Television Serviceable, and the Design Demands of Telephotoic[4] Devices

Taking the telephone, "the latest of the epoch-making inventions of our century", as his point of discursive departure, Plessner notes that "demands are increasing that, in addition to audible messages, the mirror image of man should become telegraphically transferable" and that "it is *a priori* not easy to understand why it should be so much more difficult to transmit waves of light than waves of sound through wires, once they have been suitably transformed into electrical current (p. 16). He acknowledges "numerous theoretical suggestions [and] experiments" to achieve this end, but also observes that "they have led to no results" (p. 17)[5]. His aim is therefore to "point to a new road, which may well be covered with all sorts of obstacles, but which has the advantage of not leading into *culs-de-sac* like those marching routes pursued until now" (s. 17). The first step is to identify "those elements or compounds … that could possess qualities which may be put into service to reach the intended goal" (p. 18). "At the present stage of knowledge of the elements", Plessner finds "only one substance which may harbour these remarkable qualities" (p. 18), namely the element selenium, discovered in 1817 by Barzelius, and whose "peculiar behaviour" was observed by Knox in 1837: That its "ability to lead electrical current is determined by the degree of brightness [of light] to which it is exposed". In darkness selenium offers a high degree of resistance to an electrical current, in bright sunshine this resistance is low. This discovery led "professor Graham Bell, the perfector of the Reisian telephone[6]", to "the

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[4] 'or a closer description see below, next page.

We propose this term to translate the German word telephotisch, used, but not coined, by Plessner.

[5] It is a pity that Plessner does not provide more information on its predecessors work in the field of transmission of pictures. The hypothesis of a possible transmission of pictures using the photoelectric properties of selenium was formulated as soon as in 1878 by the Portuguese Professor Adriana de Paiva, rapidly followed by the Bostonian George R. Carey and the French Constantin Senlecq. Since then the idea of using the selenium properties became a commonplace. Senlecq is the only predecessor quoted by Plessner. but one can imagine that Plessner was at least aware of the book published two years before its brochure R.E. LIESEGANG , *Beiträge zum Problem des electrischen Fernsehens. Probleme der Gegenwart*, Band 1. Liesegang Verlag, Düsseldorf, 1891. The concept of "electrisches Fernsehen" was indeed coined by Liesegang.

[6] As a German, Plessner is very sensitive to the priority of Philipp Reis on Graham Bell on the invention of the telephone. This issue is well covered in the chapyer "The Reis Question. Reis Telephone in the Courtroom – It could Sing, but Could It Talk ?" in A. Edward EVENSON, *The Telephone Patent Conspiracy of 1876. The Elisha Gray-Alexander Bell Controversy and its many Players*, McFarland & Company, Jefferson, 2000, pp. 155-164. As explained by Evenson, "Philipp Reis, an instructor in natural philosophy in Friedrichsdorf, Germany, in about 1860, began experimenting with a device for transmitting speech over a wire. He may have been inspired in this matter by an article written in 1854 by Charles Bourseul of France, who suggested how this might be accomplished. So successful was Reis in this pursuit that Germany erected a monument to him in his home town and proclaimed him the Inventor of the Telephone (Germany celebrated the 100th anniversary of the telephone in 1962). However, those telephonic honors went no further than the German border." I,n 1881, during one of the early infringment trials challenging Graham Bell's paternity of the telephone (*American Bell Telephone v. Spencer et al.*) the defense attempted to show the court that Philip Reis had seigned a speaking telephone as far back as 1862. Unfortunately the demo during the trial was not convincing and the contribution of Reis was not recognised by the court. After collecting rich evidences that it was possible, in certain circumstances, to transmit speech with Reis-type transmiiter, Everson argues that this non recognition was largely unfair : "Why the courts persistently and consistently recjected the works of Reis is still a mystery. No doubt, the prejudice was inspired by the use of the term *make-and-break* to discribe one of its operating modes. It was an unfortunate description, but once applied, a bad label is hard to remove."

inspired idea of transmitting the functions [*sic*] of a beam of light through normal wires, and through their effects on selenium allow sound waves, which were produced at a transmitting station, to ring out at a receiving station" (p. 19).

DescribingBell's apparatus – that we can identified as the photophone[7] - at some lengthPlessner continues to argue that "the unique effects of this ingenious device appears to suggest the road which should be pursued … in order to reproduce at a receiving station oscillating light that is generated by means of a mirrored and illuminated diaphragm at a transmitting station" (pp. 19-20). This technique, he proposes, could be called "telephoto" or "telephotoing" ("*Telephotik*"), in analogy to the word "telephony"[8].

Plessner then goes on to describe what he considers to be the required apparatus to produce an oscillating electrical current, which could transmit the image of an object:

> At the transmitting station A one could imagine the telephotoing object in the shape of a man-high, circular disc of some sort of black-coloured material, and – glued onto this circle, at distances at suitable intervals apart – a number of white paper strips. Each of these strips should be limited by two radial, i.e. straight, lines, and by two concentric vectors of the ring.
> Opposite the circular disc, at a suitable distance, a tripod with a specially constructed *camera obscura* of considerable size should be placed, on whose opaque glass the image of the disc would appear, in reverse position, as soon as the latter is being exposed to light. One imagines the walls of this *camera obscura* extended somewhat beyond the opaque glass, and on the inside supporting a parabolic mirror, in whose focal point – as in Bell's photophon – a wire connected to a selenium cell is to be placed. One further imagines that the glass plate is hidden by an un-transparent partition, placed between itself and the hollow mirror, and that a circular opening is made in this, corresponding in size to the mirrored image of the disc. This opening can be closed by an aperture B, which can be rotated on its centre, and in which, close to the periphery, a fine, radial slit S is cut, corresponding in length to the width of the mirrored image of the circular disc.
> If the aperture is put into slow movement on its axis, the slit in it will glide across areas of the *camera* image that are now light, now dark. Only in the first instance will light beans arrive on the parabolic mirror, from which they may be reflected onto the selenium cell. In this way the later will, during a full cycle of the aperture, only be

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[7] Bell's photophone was an apparatus allowing the transmission of sound through light. Presented in September 1880 (See BELL, A.G., "Selenium and the Photophone", *Nature,* 22, 23 Sept. 1880. and BELL, A.G., "Production of Sound by Light", *American Journal of Science,* 20, October 1880.), this apparatus was a clear demonstration that the photoelectric properties of selenium could lead to practical application. At a time where radio broadcasting was still unknow, the photophone was opening the perspective of unwired sound transmission. Although the Bell demonstration had a rapid and enthusiast impact in the world of electrecians and researchers in telecommunication, it had in reality no real practical implementation. Its mains effect was to establish the selenium in the center of early research on transmission of pictures as a plausible paragidma. Plessner's interest for the photophone is then not original and may even be considered as tardive, if not out-dated, and possibly of second-hand rather than based on a precise knowledge of Bell's texts.

[8] Again, Plessner is not original in its wording : the concept of telephotography was proposed as soon as in 1881 by the Italian C.M. Perosino. The word telephote became current in the end of the eighties, in competition with telectroscope, proposed in 1878 by Louis Figuier. The first identified occurence of the word telephote is to be found in the article E.H.[Edouard Hospitalier], "La maison Connely frères et Mac Tighe...", ***La lumière électrique,*** Paris, 1er avril 1880. This article is a sceptical relation about the hoax of the telephole proposed by Connely and Mc Tighe and related by *The American Manufacturer.*

> illuminated as often as there are white areas on the circular disc.
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> If we now throw a glance into the dark chamber of the receiving station A', we encounter, in place of the circular disc, a man-high white screen, which – obviously – is only visible when it is being illuminated. In place of the *camera obscura* in station A, a device much like a *laterna magica* would be found, its forward-facing opening covered by a similar rotating aperture, B', equipped with a corresponding slit, S'. The back part of this device would also be closed by a hollow mirror, in whose focal point an illumination device would find its place, and which could easily be brought to light up or extinguish, as *e.g.* an electrical bulb … The bulb would be connected to the wire which connects both stations and into which the selenium cell of station A is also integrated.
> … As soon as … both apertures are put into slow revolving motions, the lamp in station A' will light up as long as the slit in the aperture B glides across a light area of the image of the ring, due to light striking the selenium cell palce inside the *camera obscura* of station A, whereby its conductive capacity increases and the electrical current is correspondingly increased. The light [in station A'], reflected by the hollow mirror, is projected onto the corresponding spot of the screen through the slit in the aperture B', and appears in the guise of a line of light which moves in the [same] direction of movement as the aperture, the duration of which will be equal to the width of the of the rings on the disc in station A. By a full revolution of the aperture these lines will disappear or appear considerably darkened, as often as there are black spaces on the disc … (pp. 20-22)

From this description of the "instruments required" to transmit images by electrical means, Plessner goes on to discuss the probability of the "flicker syndrome" once the aperture reaches a certain rate of revolution, and the insufficiency of existing light bulbs for the purpose of the experiment. He then goes on to outline "the production of such a light source through the use of already existing means" (pp. 25-27).

The next step in the process towards a "serviceable electrical television" would, in Plessner's view, consist in determining whether the device would also be able to reproduce *e.g.* waves or zig-zag shapes. He comes to the conclusion that to obtain this result "the slit [in the aprture device] would need to be replaced by a minute hole … This must be movable in order to be able to slide across all points of the fields and contours present on the disc in rapid succession" (p. 28). Plessner concludes, however, that "it has been demonstrated that, with the help of a well-functioning telephotic lamp, the image of a circular disc, composed of light and dark sections, can be reproduced at a receiving station in reduced or full size" (p. 28).

Proceeding from this conclusion, and assuming the existence of an improved aperture, Plessner proposes to attempt to transmit the image of the head of a firing-range target figure, placed upright, instead of the circular disc. Once this transmission has been achieved, he does not expect "any unconquerable difficulties" in transmitting the image of the torso or of the whole figure, *i.e.* the parts closer to the centre of the circle.

He has considerably greater problems when attempting to imagine how the traits and nuances of a human face could successfully be transmitted and admits that "the most that can be achieved in this way is limited to an approximate reproduction of certain points of the contours of the head, should these be sufficiently distinct from the background" (p. 30).

Plessner therefore postulates that a "photographically true reproduction" of human facial traits will not be attainable

1) unless all rays of light reflected from points on the face can be projected onto the selenium cell, not simultaneously, but one at a time, and in rapid succession
2) unless an electrical circuit is able to transmit the oscillations in power produced by a selenium cell under the varying intensities of light to the light source at the receiving station in the same sequence and changes of intensity
3) unless, with the aid of light projection mechanisms, the equal number of rays of light, in varying intensity, can be thrown onto the wall of the receiving station within the same time and travelling the same distance as the rays in the transmitting station have travelled (p. 30).

From these conclusions Plessner conjures up the image of a face "tattooed with a great number of very minute spots, in vertical lines placed close together" as the basis for a successful transmission. These spots would be scanned by the movement of the aperture and individually projected onto the selenium cell, for a very short moment, and without distortion from light from any other spot (p. 31). He admits the difficulty of the task, but plays with the idea of a kind of optical filter, composed of minute vertical slits in a plate, or oblique lines drawn on two panes of glass, put into motion by a system of bellows. Light reflected from the object would be broken into alternating pulses [light/no light] when passing through the filter, which itself would be travelling across the surface of the object. By placing the same filters at the transmitting and receiving stations, in opposite positions at the beginning of the sequence, the reversal (mirror) effect of the image would also be eliminated, Plessner presumes.

Plessner assumes that "with increase size of the objects to be telephotoed … the size of the required apparatus will also increase", unless "indirect recordings should be successful" (p. 34). He also suggests breaking the image into several sections, each feeding impulses to its individually assigned selenium cell, much in the same way the Todd AO-system in the cinema was to do more than a half century later.

Plessner finally envisages a two-way system of telephotic communication between two persons, each in his/her telephoto-cabinet, using telephone microphones to relay audio communication along with the pictures of the speakers.

Second Section:
Telephotoing and Its Ancillary Inventions in the Service of Human Communication, the Arts and the Sciences

> Since the telephone has been put into service for the purpose of the exchange of ideas, the news services have been provided with such perfection, that, as far as speed and cost of communication are concerned, the telegraphic method of transmission of news items no longer can compete with the telephonic. This fact has led to the assumption that the development of news transmissions has reached the limits of the possible, and that one might as well decline any further efforts to bring forth even more perfect methods for the exchange of ideas than telephony (p. 38).

Thus Plessner opens the second and more essayistic section of his pamphlet. And his reply to his own rhetorical status report is 'not so': "It is in fact not really possible to see how the transmission of news could not be even more simplified", he counters, reminding the reader of the concept of telephotoing (described in the First Section).

It should in fact be possible, Plessner recons, to "photographically fix telephotoed images" (p. 39), if the light emitted at the reception station is bright enough and the most light-sensitive bromide photographic paper is utilised to make "instant exposures of telephotoed messages".

As a scenario for the application of such techniques Plessner imagines a competition "about the fastest transmission of, say, a one-hour long speech in Parliament, destined to be published in print, and [held] between two telegraph operators equipped with state-of-the-art telegraphic equipment, and two operating telephotoing and photographic instruments" (p. 40). Through detailed calculations he estimates the time from the message reaches the telegraph office at one end of a communication wire until a text is ready to be put into print at the other. It would take a telegraphist and his colleague at the receiving station some seven hours to achieve this, while a telephotoing operator and his colleague would be able to produce the same result in seven minutes, or a time-spend improvement ratio of 60:1, Plessner estimates.

Using telephotoing techniques the public could even send drawings and other images, Plessner argues, and adds that telegraph operators could no longer be held liable for errors in the transmitted text (p. 43). And with a considerably lower cost than for telegraphic messages "a not inconsiderable proportion of the public would avail themselves of telephotoing for purposes of transmission of information" (p. 44).

What Plessner describe in fact closely resembles the first generation of fax machines, the models that employed heat-sensitive paper for reception of messages. 90 years ahead of his time he prophesises that "the sum of this and numerous other innovations that cannot be described here, would bring the business of information transfer to such a degree of perfection, that, in fact, for the future any further improvement of any importance could be excluded" (p. 44).

Plessner implicitly acknowledges that 'telephotoing' is not actually 'electrical television'. But he sees no reason why living pictures could not also be transmitted in similar fashion. He therefore proposes to use the [Germanic] term 'Telekiroskopie'[9] for this "branch of the art of television"

[9] Soon, however, he introduces the term 'Telektroskopie' ('telectroscopy'), launched in 1878 by Louis Figuier, and uses this without further definition.

(footnote, p. 45), as "proposed by Senlec d'Ardes"[10], while 'telephotoing' should be reserved for the transmission of written messages.

Plessner feels confident that telephotoing will surely lead to the solution of the practical problems relating to television. Such "mirror communication" would be sufficiently profitable to allow the opening of television exchanges in conjunction with already existing telephone exchanges and "thus take 'telectroscopy' into use as a public [*i.e.* government] communication service" (p. 45). These public exchanges would be equipped with cabins from which customers would get into contact with their conversation partners who would be sitting in similar booths at another location. "Numerous persons, whose conditions in life would allow them such luxury" could even be expected to "equip their domicile with a television booth" (p. 45).

This system, which today would be called TV phone or TV conferencing facilities, would allow businessmen the opportunity to verify ledgers and display samples of goods to each other, Plessner believes. Even the "organs of State security" would profit from being able to undertake "interrogations, identifications and line-ups etc. … in the television cabinets belonging to their Service", and physicians could perform diagnosis at a distance (p. 46).

Even public enlightenment and cultural awareness would benefit:

> Considerably more distant would appear the radical changes that would be completed when the perfect solution to the great problem of telectroscopy is found and [when it is] applied to that most realistic of all arts, the dramatic art, and the salutary effects the this will have on enlightenment and refinement in the broad masses of the populace (pp. 46-47).

When this is achieved, Plessner sees "even the smallest provincial towns arriving at possessing a stage-less theatre with a large, darkened hall", where "the performance of outstanding artists from the opera and theatre stages of the cities" can be experienced at small cost (p. 47). This theatre-without-a-stage could also be used to allow the population access to the great debates in Parliament and to places and events like "the daily life in a sea-side resort, the competition in races and regattas, the spectacle of a military parade or action" (p. 47). Telectroscopy would thus contribute to counter "the further depopulation of the provinces and the uncontrollable growth of the cities" (p. 47).

Even if the solution to the problem of telectroscopy were to prove fruitless, "ancillary discoveries" should be expected. Plessner imagines the 'optophone', an apparatus which would transform sound waves into optical waves by way of light reflected from an oscillating diaphragm set in a resonance chamber, thus paving the way for "a cascade of illuminating light flowing over an area of scientific research, so far shrouded in deepest darkness" (pp. 48-49)[11]. Indeed, the same principle of "energy transfer" could be applied to graphically chart the properties of any

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[10] Obviously Constantin Senlecq, who was "notaire" in Ardres (Pas-de-Calais) and the author of the brochure *Le télectroscope,* Saint-Omer, 1880.

[11] In this case, it seems that Plessner is more original and that he was indeed the first to coin the word "optophone". Prof. Phil Picton and Michael Capp in their article "The Optophone: some questions and answers" (http://www.northampton.ac.uk/aps/eng/research/optophone/optophone.html) suggest that the term was first coined by the British researcher Fournier d'Albe in 1912. In 1920, in the Hungarian Dadaist Raoul Hausmann did also propose a device called "Optophone".

"shape, movement or reflective capacity of matter". Similarly, it should be possible to bounce light rays off differently coloured surfaces to create "perceptibly identifiable sounds" (p. 49).[12]

Plessner even imagines the latter technique applied to incoming light from astronomical sources and phenomena (sunspots, northern lights, etc.) and to make them "discernible to the human ear as audio images" (p. 51). He gets "no less enthusiastic" at the idea that the visually beautiful should, in this manner, "be found to be audibly beautiful" (p. 51) as well, even to the point of using such "sound images" to distinguish between true plastic art and "the rubbish of the naturalists of our time" (p. 52) – or even to record optomatically the lifespan of a human being, "from the low hum of the baby in the cradle" to the fading notes produced by an old person (p. 53). Similarly Plessner is convinced that "the study of audio images … will provide the poets of music with new inspiration" (p. 54).

Plessner uses Bell's photophon to support his arguments. His main analysis of Bell's invention does not, however, lie in its being independent of transmission wires, but in that it has applied "the selenomagnetic transportation of light into sound waves" in practice (p. 54): "Once the facts have been established that audio images can be produced by concentrating light reflected from a [number of] spots, varying in colour and intensity, onto a selenium cell" a number of new avenues of approach open up as to the solution of the problem of the electrical television (p. 55).

It furthermore follows from this, Plessner reasons, that the opposite is also possible. By directing a light beam onto a selenium cell, and then filtering the light trough a moving strip of glass "on which an adequate number of different large, translucent dots and lines, separated by dark intervals, have been placed" (p. 56) the same effect would be obtained as if light were reflected from an oscillating mirror membrane[13]. Creating such glass strips by hand would be doubtful, Plessner finds, but "the phonograph provides the means for manufacturing such combinations of signs in an automatic fashion". By fixing a glass tube, which is longer and of a bigger diameter than the wax cylinder, and which has been prepared with a black coating like on carbon copy paper, to the Edison phonograph, this machine would be capable of recording the oscillations of the electrical current.

In order to play back the audio signal[14], Plessner imagines a cone with a small concave lens at its apex and a selenium cell inside. This cone would be placed inside the recorded [glass] cylinder, its tip nearly touching the glass, by means of a knee-joint tube, keeping it stable while the tube rotates [and moves laterally]. By illuminating the glass cylinder from outside, the selenium cell would pick up the light penetrating the lines made in the black coating during recording and transform the variations in light intensity into an oscillating electrical current (p. 57). "Any play-back of sound waves through mechanical means must be considered erroneous, and in its place attempts must be made to utilise an imponderable medium, such as light", Plessner states flatly (p.58).

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[12] We leave to sound engineers and historians of sound recording the task to analyse if this could be considered as some insight of the principle of CD recordings : laser light bounced off a minutely refracted surface – and one that appears to be broken down into different colours when seen from an angle It certainly is a display of the powers of an imaginative and fertile brain.

[13] Plessner's explication in German is extremely convoluted at this particular point. His point seems to be that sounds can be replicated by means of the oscillating electric currents, produced by the selenium cell.

[14] "The spoken word" in Plessner's own words in the text. Up to this point, however, he has scrupulously avoided any reference to spoken words or music and been very general in his descriptions.

He goes on to imagine "the production of phonograms in a photographic manner", in which a strip of light-sensitive paper inside a dark box is pulled at a steady speed by a clockwork mechanism past a light-beam of varying intensity, controlled by al selenium cell. Running the [exposed] paper strip back under a strong light which is reflected onto a selenium cell would serve to reproduce the sounds recorded, although "it would be better if the recording was made on a translucent material and then lit from behind to produce the variations in illumination required by the selenium cell" (p. 59). Such an instrument could be called an "optograph" to distinguish it from the phonograph. One could further imagine the light falling onto a moving photographic paper and being recorded in the shape of a zigzag line, which would be of the utmost importance, as photostenography would result. By adapting Helmholtz' resonator, combining it with a reflecting diaphragm and glass tubes lit sideways, Plessner envisages the possibility to "display the spoken word in the guise of decipherable hieroglyphics" (p. 61).

Wit the aid of the "to last-mentioned and extremely promising instruments a number of innovations and improvements to all manners of human undertakings are imaginable", Plessner feels (p. 62). Among them:

1. The introduction of a world alphabet, based on phonoptographic recordings
2. A phonoptographic universal dictionary, from which also the correct pronunciation of all the world's languages could be learned
3. Sending phonoptograms through the mail (as substitutes for dictated letters)
4. Correct pronunciation of one's own native language, as well as "foreign idioms" [*sic*]
5. Teaching correct pronunciation to deaf-mutes, by comparing phonoptographic transcriptions of their pronunciation with the correct ones
6. Facilitation of the study of stenography and its harmonisation with the proposed universal alphabet
7. Such "stomascript" could be automatically printed on standard sheets of paper rather than on long rolls of paper by fitting a mechanism like the line-return on typewriters to the phonoptograph
8. The blind could use the phonoptograph to make written statements, and the optograph to receive the same
9. Mass duplication of readable or audible stomascripts could surely be easily undertaken by some sort of printing process
10. Scientists, authors, reporters and others would no have to go through the tedious writing process to put their thoughts on paper, it would suffice to express them orally
11. Books for the blind could be produced in a loose-leaf diaphone-printing process
12. Newspapers for the blind would be produced in optographically readable form

The three selenomagnetic instruments – the optophone, the optograph and the phonoptograph – are the most valuable ancillary inventions to be expected from the development of the electrical television, Plessner concludes (p. 64). At a more remote distance in time, however, one should expect even more important discoveries to be made:

> The generations of the future … will invent recording processes and make instruments … and will expect these devices to incorporate important contemporary events, so that these may be exposed to eye and ear after centuries. They will demand … to experience – lifelike and in the flesh, so to say – the great men of former generations … They will aspire to take part as observers in the great events of the past (p. 64).

To achieve this, Plessner does "not find it difficult, even from a contemporary perspective, to approach a vision of these powerful instruments of the future" (p. 68): The small was cylinder of the phonograph will be replaced by two huge glass cylinders, the size of steamer funnels, covered

in a light-sensitive material. A number of selenophotographic cells will record the image on one cylinder, while a foghorn-like contraption will capture sounds for recording on the other. To replay the recorded scenes, the cylinders will be lit from within and the oscillating light emerging from them will be captured by selenophotic and optographic devices and transformed into sounds and images, the latter projected on an opaque glass screen the size of a theatre stage. Such an instrument for the simultaneous recording of sound and images could be called a "diplohyaloscope", possibly shortened to "hyaloscope", Plessner suggests. A machine designed to reproduce images only could be called a "hyalophot", while one designed to reproduce sound only could be called a "hyalophone" (p. 68-69).

Plessner rounds off his presentation of these "powerful contraptions of the future", og which he considers the hyaloscope "the most excellent of instruments ever to be made by human hands" (p. 70) by making "the attempt … to sketch a fleeting description of the hyalographic representation of one of the most memorable historical events of the recent past", namely the victory parade of the German army, returning from the 1870-71 war with France (p. 72-75).

He then goes on to argue – in high rhetorical style – against scepticism in regard to his prognoses, even if – as he admits – they could easily be construed "by many lay observers … as the subjective inventions of an autodidact with vivid powers of imagination" (p. 76). In doing so, Plessner briefly resists most of his earlier hypotheses and conclusions. He rounds off his text with a summing-up of the "the observations proposed in the present text concerning the future of the electric television" (pp. 83-86):

1. The image of a circular disc, comprised of light and dark squares, can – with the use of existing optical and electrical devices – be brought to reappear at a distant receiving station, provided that the telegraphic connection to the emitting station takes place without the aid of mirror galvanometers or amplifiers.
2. Photographic snapshots of the image of this disc may be made in the usual way as it reappears at the receiving station.
3. If mirror images of other objects … can be brought to reappear at the receiving station, can neither be confirmed nor denied before on-going experiments are concluded. should the former be the case, the current mechanical method of transmitting missives electrically could be substituted by selenomagnetic transmission of the light rays reflected from the original text page, and by photographing the image of it that reappears at the receiving station (telephoto).
4. If even the telephotic replication of the human guise should be successful, it would not appear difficult to establish long-distance communication stations where people who wish to enter into verbal exchange of ideas could also see each other (telectroscope).
5. By connecting a listening telephone to a live wire, through which the varying strength of an electrical current, produced by a selenium cell onto which the [reflected] light from all points of an object, is fed, the visual appearance of this illuminated object is changed into acoustic impulses and is made audible as a sound image – possibly by means of the appropriate connection to a string instrument (ortophon).
6. If the light from a mirrored diaphragm, which is brought into vibrations by speech, is reflected onto a moving strip of light-sensitive, more or less opaque paper, it should be possible, through strong illumination and rapid movement of the latter across a selenium cell, and with the aid of a listening telephone connected to the same electrical circuit as this cell, to make the spoken word discernible (optograph).
7. If one separates the light reflected from a mirrored diaphragm, set into motion by speech, into a number of separate rays, and if one directs those onto a moving strip of light-sensitive paper, it should be possible to record the spoken word in the shape of readable

hieroglyphics – in other words the graphic representation of thoughts – through dictation, rather than through the cumbersome process of writing (phonoptography).

8. To the degree that the replacement of the phonograph by the optograph is successful, it may be expected that the sound waves metamorphosed by this speech machine can be made much clearer if they are recorded on the surface of rotating glass cylinders, which have been made sensitive to light, rather than on light-sensitive paper (hyalophone).
9. It remains a question to be answered by adequate experiments whether it will be possible to record, in a reproducible manner, the light reflected directly off an object onto the light-sensitive surface of a rotating cylinder, rather than by the indirect means of light oscillating from a vibrating mirrored diaphragm (hyalophotography).
10. In the case hyalophonic and hyalophotographic recordings and play-back is successful, no major difficulties will block the road to simultaneous recording of sound and image, and their simultaneous reproduction (hyaloscopy).
11. If, upon solution of the problems related to telectroscopy, it will prove possible to establish a two-way visual connection between two stations through only one wire remains to be seen; it is to be expected that two wires will be required.
12. Finally, as far as the telectroscopic and hyalographic reproduction of natural colours is concerned, this canot be put to the final test as long as the problem of photocromaties has not been solved with finality.

Final Reflections

"If one compares the numerous changes and improvements, up to final perfection, of mechanical devices with the deformed embryo from which they developed, then it appears almost incomprehensible that from such imperfect beginnings could rise a perfect tool.

However, the many deficiencies of all drafts for new inventions have their origins in the fact that the human spirit remains bereft of the gift to create important technical innovations in one leap. It is Nature herself that guides the inventor and indirectly steers his hand, taking the raw material that is [the human] limited creative capacity step by step towards perfection", Plessner opens his final reflections (p. 86), before going on[15]:

"It would therefore be a totally erroneous point of departure to believe that the solution to the problem of electrical television lies in the meticulous construction of those optical, mechanical and electrical instruments that are described in this pamphlet. And it would be no less erroneous to assume that, if the experiments described were to be unsuccessful, these – or other devices currently available – would be able to solve the problem of creating projected images at receiving stations. It must be the task of the inventor to bring to perfection the devices here described, or to dispense with them and make other, appropriate choices.

Among the devices that possibly could make indirect telephotic recordings functional, are those using, for example, conical, spherical, prismatic or cylindrical mirrors. Such anamorphic devices would allow the number of light-reflecting dots in a photographic image to be increased enormously, if such an increase should prove necessary for the telephotic and telectroscopic

[15] In this section, the translator has chosen to translate a selection of full-text passages, rather than to provide a synthesis of the views expressed by Plessner. The hope is that, by quoting the author *ad verbatim*, his arguments, as well as his style of argumentation, will provide the reader with a further insight into Plessner's frame(s) of reference.

recreation of images. A decrease in the number of dots needed could be achieved by the use of microphotographic techniques.

It would, at this point, be totally impossible to enumerate the manifold ways to overcome all possible obstacles to the recreation of images. The initial attempts to solve this problem can only, as already stated, aim at identifying these avenues of approach that will not lead into dead-ends. Such modest ambitions, however, should be well served by the combination of optical, acoustical and electrical devices that have been described" (pp. 87-88).

"Only by recognising what Nature has not revealed through the tools provided to him can the researcher understand how things must really be, what requirements exist to meet the demands of the desired services" (p. 88).

"A striking example of how unnecessary it is that there exists a mutually [useful] exchange between the inventors and their environment, is provided by the fate of the first inventor of the telephone. No-one who knows the life story of this man can be in any doubt that he possessed adequate knowledge and talent to bring his brilliant work to fruition. But the understanding and support of his contemporaries failed him, and without these the inventor, who is neither producer nor salesman, cannot achieve the introduction, nor the marketing of his work. Instead of support from his homeland, he received an ice-cold reception which froze his industrious limbs, thus robbing his nation not only of the honour to have participated in implementing one of the greatest inventions ever, but also of the tribute of foreign powers and the opening up of new and extremely promising sources of income" (pp. 89-90)[16].

"It is all about allowing those far-seeing men the confidence they need to allow them to free themselves from the bonds of material worry, to spread their wings of genius and to prove the worth of the practical application of their fantasy. Only in this way can he [the inventor] succeed in raising the enormous amounts needed to pay for a small army of precision workmen as well as for the expenses of countless negatively answered questions to Nature, and to balance the financial results of some less successful attempts, in order to turn them into gloriously profitable projects" (p. 90).

"To finally again address the question of how the first round of a successful assault on the electrical television may be approached, the gaze involuntarily turns to that youthful country which already has been the birthplace of so many admirably inventive innovations. Unless all signs are misleading, the great Republic of the West seems preordained to see one of her sons as the victor in the great global competition to solve the prize question of the electrical television. And yet the important question is not who succeeds in this great act, but that it is successfully completed. And if one day the glorious news should penetrate across the ocean that this new victory of the human spirit over matter has indeed been fruitful, then the researchers of the old world, for whose endeavours there was no demand in their homelands, will surely not envy the deserved one his crown, but will hail that land, which not only protects the spiritual capital of the well-off, but also gives its share to the poor inventor, with the shout of 'Hail Columbia!'" (p. 91).

Plessner appears to have intended his text to end on this ringing note. However, as a 'tail' to those 'Final Reflections' Plessner seems to have added the following two paragraphs in the last stages before the printing of the pamphlet:

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[16] This is obviously a reference to Philipp Reiss, the forgotten German inventor of the telephone that Plessner also mentions on p. 18. See our note 6. Plessner seems to identify with him - and with his sorry fate –and that also adds to our psychological portrait of Plessner.

Since the publication of this text some of those prognoses concerning inventions expressed herein seem to have come closer to their realisation than even the author could have foreseen. Thus publicly available journals carry despatches on an exchange between the members of the Chicago [World] Exhibition organising committee and Mr. Edison, according to which the latter is supposed to have stated that he intends to manufacture a new invention for the World's Fair, by means of which one may peruse, on a screen in one's own room, the image of an opera singer, situated on a distant stage, and simultaneously perceive his song, as well as the orchestra. – The invention of this 'Kinetograph', as this combination of photography and electricity is known as, will, during the time remaining until the exhibition, be improved to such a degree, that even the colours of the costumes of the performers will appear in true-to-nature reproduction.

Mr. Edison believes to be able to achieve such optical reproductions of stage performances by means of a considerable multiplication and rapid reproduction of instantaneous photographs, while it still remains unexplained in which manner the appearance of colours will successfully be made (pp. 91-92).

TRANSLATOR'S NOTES ON THE TEXT

On Dating the Text

The original text, from which this translated abstract has been made, is dated by the publisher, Ferd. Dümmlers Verlagsbuchhandlung in Berlin, Germany, to the year 1892. The author's foreword is somewhat more precisely dated 'Berlin, New Year's 1892'. It would thus appear that the manuscript has been finalised by Maximilian Plessner during the first days or weeks of 1892, and subsequently been printed and published later that same year.

In his short 'tail' to the 'Final Reflections', however, Plessner uses the phrase "since the publication of this text", thereby suggesting that the volume from which the translation has been prepared (located in the Central Library for Physics in Vienna and carrying its stamp and catalogue number) could be a second edition. By not distinguishing between the editing of the text and its appearance in print (its actual 'publication') Plessner creates – consciously or unwittingly (there is no way of telling whether Plessner is acting with premeditation and intent or not) – a certain confusing imprecision that would – if taken at face value – tend to put Plessner in a favourable light, as having rushed a second edition into publication as soon as he had received the latest information on Edison. There is, however, no indication, neither from the publisher nor from the library, that this has been the case. It must therefore be assumed that, despite the 'tail', the present text is the original one – and the only one published, sometime in early 1892.

The reference to "the exchange" between the organising committee of the 1893 Chicago World's Fair and the American inventor Thomas Alva Edison further serves to substantiate this view. The actual newspaper article(s) rather fleetingly referred to by Plessner are not identified, nor has it been possible to search for them. But according to Edison's most recent biographer, Neil Baldwin (*Edison: Inventing the Century*. Hyperion, New York, 1995), Thomas Alva Edison by 1891 had "every intention of making a big splash … at the Chicago World's Fair Columbia Exhibition" and had begun to "talk up his new 'happy combination of photography and electricity'", i.e. the kinetoscope, to the press by this time. Edison had deposited a patent application for the kinetoscope at the end of July 1891, after a first demonstration to the US convention of Women's Clubs (of which Mrs. Edison was a staunch and distinguished member) in West Orange, New Jersey, on 20 May 1891. The fall-out in the German press from the PR offensive mounted by Edison, which Baldwin alludes to, may indeed be the source of Plessner's information when he – probably during proof-reading – added the 'tail' to his already completed text – again, most probably, during the first days or weeks of 1892.

However, Plessner (who seems to attempt to raise the status of the newspaper reports he may have read to papers in scientific journals) has failed to observe the publication of descriptions of the Edison kinetoscope in *Harper's Weekly* (June 1891) and in the *Scientific American* (20 June 1891). - As fate would have it, the development of the kinetoscope was delayed due to the the illness of Edison's assistant W.K.L. Dickson, and the machine never made it to the Chicago World's Fair, where, however, a number of other Edison inventions were on display from the official opening on 1 May 1893.

In Europe, the first report on the actual operational kinetograph was the article by Octave Uzanne which appeared in *Le Figaro* on 8 May 1893[17]. Uzanne had interviewed Edison in West

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[17] Uzanne's paper was reproduced in UZANNE, O., *Vingt jours dans le nouveau monde,* May & Motteroz, Paris, [1893], pp. 59-72 under the title "Chez Thomas Edison – A Orange Park – Le complémentaire du phonographe : le kintetograph". When introduced to the kinetograph, Uzanne asked to Edison "Mais n'est-ce pas la même chose que le téléphote ?". And Edison answered, smiling : "*Le téléphote* n'a jamais existé que dans l'imagination des *news-paper men*

Orange on 26 April 1893 and was apparently the first journalist to benefit from a demonstration of the kinetsocope (that he was confusing with the kinetograph). Edison made a demonstration of the kinetoscope to the American journalists on 9 May 1893, i.e. one day after the publication of Uzanne's paper. As the addendum does not make reference to this official presentation of the kinetograph, one can safely conclude that the addendum (and then the final proof reading by Plessner) is anterior to May 1893.

In fact, as the reference made by Plessner himself is not to a demonstration of the kinetoscope, but to Edison's "exchange" with the organising committee of the World Fair as to its potential exhibition, it is reasonable to assume that the addendum was written quite a bit earlier than Uzanne's article: Uzanne interviewed Edison only four days before the World Exhibition opened. Any discussions between Edison and the organising committee must have taken place well before the opening on 1 May 1893. Plessner's dating of the addendum to "New Year's 1892" thus seems credible. This (again rather imprecise) date also corresponds well with the PR campaign for the kinetoscope, which Baldwin dates to 1891. By late 1891 or early 1892 it is probable that reports about such negotiations might have made their way into the German daily press.

It is also interresting to note that the only two identified quotations of Plessner's brochure are from 1898[18] (see below).

On Stylistic and Biographical Elements of the Text

According to the reference on its cover, Plessner's brochure was published by Ferd. Dümmlers Verlagsbuchhandlung in Berlin. Despite the appearance of a *bona fide* publisher's name on the frontispiece, it may well be that the brochure was, in practice, published by Plessner himself. '*Verlagsbuchhandlungen*' [literally 'Publishing Booksellers'] such as Dümmler's would take literary text in commission, have them printed, bound, published (which also entailed providing copies to the censorship office as well as to the State library for legal deposit) and sold, but generally at the author's own expense. As the Prussian censorship laws required all printed material to have a 'responsible' publisher, the *Verlagsbuchhandlungen* offered a flexible solution, a sort of one-stop-shopping, for authors whose texts were not accepted for publication by the normal publishing houses – and for authors who believed they stood a better chance of economic return when simply paying the *Verlagsbuchhandlung* for its services, rather than being remunerated through the royalties from a publisher. We do not know. however, what the circumstances surrounding Plessner's brochure in fact were.

The brochure itself does not contain any biographical data on Maximilian Plessner, except for his own reference to his status as a retired officer in the Prussian army. His use of the word 'Prussian' suggests, however, that his army days lie before the German unification, which followed from the victory in the war of 1870-71. Thus nearly 20 years may have passed since Plessner served the Prussian king, who was to become the German emperor after the proclamation of the German state in the Mirror Hall of Versailles in 1871.

These facts may serve to establish Plessner's age. If we assume that Plessner had joined the Prussian army and advanced through the ranks, attaining the rank of captain by 1870, he would –

; je ne m'e suis jamais occupé, car je ne m'occupe que de *choses utiles*". On this interview, see also MANNONI, L., *Le grand art de la lumière et de l'ombre – archéologie du cinéma*, Nathan, Paris, 1994, pp.367-371.

[18] "Jan Szczepanik und Maximilian Plessner. Der Erfinder des Telektroskops und sein Vorläufer", *Vom Fels zum Meer*, Stuttgart, Mai 1898, pp. 160-165. and in B.SCHÖFFLER, *Die Phototelegraphie und das elektrische Fernsehen*, W. Braumüller, Wien, 1898, 27 p.

most probably – have been born no later than in the 1840's, and thus a man in his fifties (or older) when he wrote his pamphlet on the future of the electrical television.

Further clues to Plessner's biography are, however, provided by Gustav Klitscher(?) in his 1898 article "Jan Szczepanik und Maximilian Plessner, der Erfinder des Telektroskops und sein Vorläufer" ["Jan Szczepanik and Maximilian Plessner, the Inventor of the Telectroscope and His Predecessor"], published in *Vom Fels zum Meer* in Stuttgart in May, 1898 (available on this site). Apparently based on at least two encounters that the writer had with Plessner, one of them evidently prior to the publication of *Die große Erfindungen* in 1893, and the other one in preparation of the *Vom Fels zum Meer* article, the 1898 text reveals Plessner as the inventor of the "antiphone, … [a] small device, by which one can close the ear channel and intermittently may reach almost complete deafness". Even as perceived as a toy, this invention is credited with having provided Plessner with the financial independence needed to pursue his "greater works", i.e. the writing (and probably the publication costs) of *Die große Erfindungen*. Klitscher seems to have visited Plessner in his home on the western outskirts of Berlin, near the Botanical Gardens. His scant description suggests a man obsessed with peace and quiet, who labours in seclusion on his theories. Klitscher also shows a pronounced respect, even reverence, for Plessner, a true patriot who has suppressed his own work (in fact, the intended volume two of *Die große Erfindungen*) on air traffic due to the military uses to which he estimates that his studies might be put by foreign powers.

Indeed, his military past seem to have made a lasting impression on Plessner. His enthusiastic description in *Die große Erfindungen* (pp. 72-75) of the victory parade of the German troops after the war with France in 1870-71 (as he imagines it might have been captured by the *hyaloscope*) suggests that Plessner had witnessed, if not himself participated in, the event, and his observations on the importance of the event (and its preservation for posterity) have more than a ring of new-found national pride to it.

Plessner provides some fascinating insights into his own political and social worldview in this description, and from an historical and biographical point of view, I regret having sacrificed the victory parade passages from the above text, for the sake of focus and (relative) brevity in the abstract. While it has very little to do with the electrical television, the picture Plessner paints of the victory parade provides a fascinating insight into his personal stake in the collective German consciousness and the *Zeitgeist* of the young German nation: He obviously regards the possibility of reproducing the rousing atmosphere of the event as a means of nation-building: "Watching [the recordings of the parade] would have moved the hearts of the shaken spectator with an indescribable experience; the dejection that had encompassed their feelings of pride until this time would have fallen away, and their enthusiastic cries of 'Long Live!' would have mingled with the swelling 'Hurrahs!' coming from the realm of the shadows, joining to form an engulfing cry of jubilation, in which the voices of the living could no longer be distinguished from those of the dead" (p. 73).

Plessner's feeling are surely patriotic, probably chauvinistic, and certainly martial, as when describing the appartition of general Bismark, without mentioning the name of the German commander and later Prime Minister of the new German state, as "the martial [figure of the] conqueror of virginal Metz … the brilliant battle mind … the successful reformer of the Army" (p. 73).

There is no reference to Plessner's army days in Klitcher's article. Nor is there is anything to suggest that by 1898 Plessner had abandoned or modified the ideas he had set forth five years

earlier in *Die große Erfindungen*. But neither is there any indication that Plessner's work on the electrical television had progressed, or that others had taken it up.

There seems to be one main reason why Klitscher should wish to bring Plessner back into the limelight again in 1898. Klitscher is anxious that Plessner should be given due credit for having been the first to suggest selenium as a solution to the problem of transforming an image into electrical impulses that could be transmitted over a distance, to produce a 'mirror image' at a receiving station. But why this urge and urgency? Is the reporter motivated to pay homage to a man he respects and admires, in order to ensure that he is duly recognised for the (apparently) fundamental contribution he has made to someone else's break-through invention? Is Kitscher trying to carve out a place in history for a man who is getting old and frail? Or is he rather trying to boost Plessner's career, to support and provide credibility to his ideas on harnessing wind power? Is Klitscher acting on his own, or at Plessner's instigation? Is the prospect of a social or pecuniary reward involved, like a medal in honour of Plessner's work, or his admission to an elective scientific society? Or even a state pension? The article provides no clues, but Plessner's reappearance – so to speak in person – in this 1898 article seems a bit in excess of what his contribution to Szczepanik's invention would seem to merit.

The article by Klitscher does seem to solve another question raised by *Die große Erfindungen*. As observed above, Plessner announced in the Foreword that he considered the electrical television and the development of air traffic to be the two most important challenges facing society (p. 11) and his intention to treat each of these questions in his publications. Indeed, the brochure published in 1892 is clearly marked with the roman numeral 'I' before the sub-title *Die Zukunft des elektrischen Fernsehens*, thus leading one to assume that there would also be (at least) a volume II, dedicated to air traffic. On the evidence of Klitscher's article it can now safely be assumed that this second *opus* was never published, but was suppressed by Plessner himself because he had had second thoughts about how his knowledge and observations could be exploited for military purposes by Germany's enemies.

Instead, it seems fairly clear that Plessner has devoted his energies (no pun intended!) to research and theorise over how wind power could substitute and eventually supplant steam power. He even has calculated the (considerable) savings to be made from substituting steam engines with a wind-powered device of his own construction.

The notion of developing wind power, we only know from Klitscher's rather brief description, which is a pity, not only from a scientific and historic point of view. Even in a literary sense it would be interesting to examine this very up-to-date idea, presented in Plessner's bombastically enthusiastic steam-roller writing style: When describing mechanical contraptions and constructions, Plessner's prose sometimes transforms into a sort of stream-of-consciousness description, floating along the instrument as an electrical impulse would. The result is, in practical terms, extremely long sentences that need to be chopped up into shorter ones for the purpose of translation. Yet his argumentative mode is never far away. When sensing himself out on a speculative limb, Plessner does not hesitate to fire off the heavy rhetorical guns in order to defend (or maybe to mask) a fanciful jump of imagination or a weak technical argument.

In defending his stated objectives of providing the enthusiastic would-be inventor with a tool-kit of ideas and suggestions, Plessner's rhetoric is unstoppable. Here all counter-arguments to his project are reduced to uninformed scepticism or pushed aside with boundless optimism for the manifold opportunities of the future.

This argumentative energy provides another fascinating piece of biographical circumstantial evidence: There is a faint resonance of the frustrated or disillusioned inventor about Plessner's writing. He never acknowledges having experienced set-backs in trying to put together his many brain-childs, or having been unsuccessful in attempting to sell his ideas to financial backers, but several small – and often quite unnecessary – details in the text might hint at such a background to his writing: His admonitions to young inventors to protect their ideas through patents, his invectives against big capital and his belief in America as the only place where inventors have the necessary elbow-room to put their ideas into practice may serve as examples.

Similarly, there is an almost audible cry for recognition running through Plessner's pages. His attempts to pass himself off as an authority in his field, but without reference to any studies or degrees, save his military rank on the title page, or (alternatively) to any major personal achievements, speak volumes as counterfactual indicators. At one point in *Die große Erfindungen* (p. 76) he refutes claims that he may be "an autodidact with vivid powers of imagination", but without offering substantial proof to the contrary. Plessner's initial apologies to the "learned scholars" in the Introduction, when justifying his project for being aimed at the inspired and talented lay readership, may suggest a need to protect himself from criticism from trained minds, but at the same time implies a strategy for trying to establish association with the scientific community by implication.

Plessner must therefore have felt no small amount of vindication from reading Klitscher's article. Finishing his eulogy of Plessner, the visionary inventor, Klitscher dubs him "an idealist in [the current] age of pessimism", a sentiment and an appreciation that surely must have pleased the aging Plessner.

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