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SCIENCE AND ITS PUBLIC: POPULARIZATION OF SCIENCE IN VIENNA 1900-1938

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> *The problem of what "science" itself is has to be posed. Is not science itself "political activity" and political thought, in as much as it transforms men, and makes them different from what they were before?*
>
> (Gramsci Antonio, in Bourdieu & Wacquant, 1992: 47)

"Today Vienna is considered as one of the cradles of modern culture and this in nearly every domain", Michel Pollak (1984) introduced his book *Vienne 1900*. Indeed, many accounts have been written on the outstanding cultural life of Vienna in the first few decades of this century (e.g., Schroske, 1980; Janik & Toulmin, 1973; Johnston, 1972) and virtually all of them make reference to the exceptional *scientific spirit* that prevailed, and the impact this had on the developments in many other domains of social, political and cultural life. However, when getting to the level of detailed investigations, the majority of the studies chose to center around the development of domains like philosophy, psychology, art, music or arcitecture. Unfortunately, no comprehensive effort has been undertaken so far to describe the situation of the "exact sciences" in Vienna during this period or to elaborate in depth what is labeled *scientific spirit*. This fact is particularily astonishing, as in Austria – similar to most European countries during the late 19th/early 20th century – a very positive climate for science prevailed which led to a very fruitful development in many disciplines. Indeed there was a high level of public interest in science and any scientific progress was also expected to bring advantages on a global societal level (Engelbrecht, 1986: 240). The list of outstanding scientists who were part of the Viennese academic life is indeed impressive, embracing in the physical sciences Ernst Mach, Ludwig Boltzmann, Lise Meitner or Stefan Meyer, just to mention a few of them.

Considering the role of science in the beginning of the 20th century it is also important to underline the fact that many of the personalities shaping the cultural and political life in Vienna had been trained scientists such as Victor Adler – to mention but one example – who is generally referred to as the father of socialism in Austria (Johnston, 1972: 112-121). The understanding they had of the relation between science and society largely determined their political ideas and inspired their social programs.

When trying to grasp the place science occupies in a particular cultural context, identifying the conditions for major change in the relation between science and society as well as understanding the balance between authority of science in a society and its ideological dimensions, it seems to be a promising approach to investigate the diffusion processes of scientific information to a wider public – an activity which has often been summarized under the term "popularization of science". What individuals believe about science, the pictures that prevail in their heads, the attitudes they take towards science as well as science-related, political and social issues, all that is largely determined by the kind of information channels that are institutionalized, by their accessibility, by those who take the role of mediators and finally by the way the diffused information is selected, processed and reintegrated into a wider, non-scientific context.

The perception of the communication process between science and a wider public has been dominated for a long time by linear diffusion models with scientists on the one hand generating genuine scientific knowledge which was regarded as superior to any other kind of knowledge produced – it claimed universality, objectivity and political neutrality. The lay-public on the other hand was simply restrained to the role of a passive receiver. The link between the two groups was maintained by the popularization process, which was thought to be simply a kind of translation process. The important role of the mediators, scientists claimed for themselves for quite a while.

Since the 70s, however, social studies of science have clearly moved away from this image and started to deconstruct not only the production process of scientific information, but also its dissemination process. Any kind of media is therefore no longer expected to simply "tell stories", to describe "reality" in a "correct" though

simplified way. It has become clear that in any process of popularization choices are made between different kinds of information, expert authority is introduced when the degree of complexity becomes high, a particular language is chosen, and metaphors and pictures are introduced. We also must allow for editorial biases and changes mandated by force unrelated to any positive or negative assessment of science's worth, such as the economics of publishing or the rise of competitive sources of information. Thus the discourse between science and a wider public should be understood as a negociation of meaning, depending upon a wider societal, economic and political context as well as on the audience it adresses.

More recent research, such as the work by Cloître and Shinn on enclavement and diffusion of knowledge have brought the interesting facets of the popularization process nicely to the point. They argue that "in the case of popularization of science, the language, the reasoning and the images do not manage to elucidate the phenomenon, but quite to the contrary there is a tendency to create a conceptual incomprehension. (…) Popularization constitutes thus not an efficient instrument for the transmission of a better knowledge about the physical world. Its force and its pertinence lays in the links which it establishes between a scientific subject and the social sphere" (Cloître & Shinn, 1986). A similar view was also expressed by Schiele and Jacobi, stressing that indeed "it is of secondary importance if the information processed (in the course of a popularization effort) is wrong or right or up to what degree it is wrong or right, compared to the very fact of the existence of this discourse and the interpretative framework this offers to the practitioners" (Jacobi and Schiele, 1988: 14).

The fundamental turn in the understanding of the role of popularization of science also opens up completely new possibilities to investigate the integration of science in a wider societal and cultural context. A detailed study of the popularization efforts in a specific period in time could thus reveal not only the divers societal influences on the way science is perceived, but show in a rather clear way in how far the authority of science was put at the service of social interests or was used as legitimation for political aims.

This is the starting point for a research project under the title "Science and the Public in Vienna 1900-1938" whose aim is to investigate the relation of science and

society as perceived in the mirror of the main popularization efforts in the press and in the framework of the so-called popular university movement. Being still at the very beginning of the detailed empirical analyses, I will restrict myself in this presentation to the outline of the main guiding ideas. After some short remarks on the specific situation of Vienna at the turn of the century, I will identify the main forum were science met wider publics, the actors involved and the respective importance of the media during the period covered by us. To complement this information as well as to round off the picture I will then try to grasp the general rethoric that was developed around the topic of popularization of science. This will convey an impression of the motives and the aims of these intense popularization efforts, but also of the fundamental contradictions that were and still are characteristic for this debate.

As the title of the presentation indicates two clear choices were made – the period in time and the restriction to the city of Vienna. For the choice of the period 1900-1938 several reasons can be put forward. While in many European countries popular science writing as well as other forms of diffusion of scientific knowledge to a wider public had come to play an important role already in the early 19th century (e.g. Bayertz, 1985), in Austria such a trend can be diagnosed only for the last two decades of the 19th century, reaching a climax between 1900 and the beginning of the First World War. The first popular magazine *Das Wissen für Alle* was founded in 1901 and regular features on science started to appear in daily newspapers. These developments have to be seen together with the popular university movement which also took off at the beginning of the 20th century. An additional reason to chose this period lies in the rapidly and dramatically changing socio-political and socio-economic environment from the Monarchy to the First Republic and to Austrofascism. This offers the fascinating and maybe unique possibility to investigate the relation between science and a wider public under societal parameters that were altered so dramatically several times during such a short period in time. Further, the period is very interesting as the sciences lived a revolution. While at the turn of the century most scientists thought that "physics was in its basic understanding a closed field and any further development would be the clarification of unimportant questions" (AZ, 1932) this view was completely turned over by quantum physics and relativity theory. As often referred to in newspapers in the late 20s and early 30s, not only society lived a major crisis but

also science. Finally, this period can also be characterized by the development of innovative forms of popularization of scientific knowledge, such as the visual communication of Otto Neurath (Stadler, 1982).

The restriction to Vienna, when speaking about popularization of science in Austria, can also be argued for. It was the capital of the Austro-Hungarian Empire and later also of the newly founded nation-state Austria and, although during the monarchy, other towns were also important for the scientific life (e.g., Prague or Budapest), Vienna nevertheless held an outstanding position with regard to cultural as well as scientific life. What is more, Vienna surely was the major site that concerned efforts in popularization of science. Both Viennese newspapers dominanted the national context for quite a while and the main activities of the popular university movement were also centered in Vienna.

Vienna 1900-1938: a period of fundamental changes

It would go far beyond the scope of such a short presentation to draw a more or less coherent picture of the general situation that prevailed in Vienna during these four decades of the 20th century. Nevertheless it is important to assemble some basic information in order to get a feeling for the context and to allow for a better understanding of the discussion about popularization of scientific knowledge.

On the political level, the period 1900 to 1938 obviously falls into three major sections: the Monarchy, the First Republic and the period of Austrofascism. As the last decades of the Monarchy were most fruitful with regard to popularization of science I will put the main weight there.

Indeed, Vienna underwent at the turn of the century a complete restructuration. The first and most visible aspect were the dramatic demographic changes occuring. Vienna went from 287,824 inhabitants in 1857, to 721,551 in 1880, to more than a million before 1890 and to two million in 1910 (Pollak, 1984). Thus in only 50 years the population of the city increased by no less than a factor of 7. This development needs to be interpreted in the context of modernization and industrialization. After a first period of accelerated economic growth which had taken place in the period from 1867 to 1873, the Austrian-Hungarian empire lived – although late in comparison to other Western countries – a second such period

between 1900 and 1914. Indeed, against the end of this period the empire had reached the economic level of major Western countries such as France (e.g., Fejtö, 1993: 161). It meant the construction of an extensive railway-network as well as the setting up of a mechanical, electrical and armament industry. Vienna became the administrative and financial center and thus attracted many tens thousands of people from all parts of the empire. However, it was exactly this economic success, the speed of industrial, commercial and cultural developments which created severe problems for the institutional superstructure which was more or less archaic. The dynamism of the production forces associated with the liberty of the press which allowed for critical voices shook the fundaments of the autocratic institutions. It caused increasing conflicts between those who gained by the new system and those who were to be the loosers. Severe class-conflicts were the direct consequence of the increasingly opressing capitalist structures. Indeed it was the progressing industrialization which began to destabilize society.

Of course the situation of Vienna cannot be understood without taking into account the nationalist conflicts that played an important role – elitarian spirit cohabitated here with an ever-increasing working class coming from all parts of the empire. Vienna hosted in 1913 about 30 big factories which each employed more than 1,000 workers. Thus, at the turn of the century, Vienna had become "a city with two faces" (Fejtö, 1993: 164): the quasi-provincial, bourgeois, traditionalist and anti-capitalist Vienna on the one hand and the city of workers, engineers, employees, intellectuals and artists on the other hand – a capital in which more than 20 languages were spoken.

Finally, we also have to keep in mind the diversification in the political science with the creation of several political parties during the last decades of the 19th century. The problems accompanying the implementation of a market economy had contributed to the increasing discrimination of the liberals and finally gave way to the installation of three major political forces in the Austrian-Hungarian empire: the German nationalists, the Christian socialists under Karl Lueger and the social democrats founded by Victor Adler. While the former two parties had the bourgeoisie as their main clientele, the social democrats took in charge the aspiration of the increasingly important working class. Attacking capitalism in its existing form and fighting for social reforms as well as for universal suffrage, the

latter became an important force of cohesion in the monarchy. Indeed much effort was spent by the social democrats on making a peaceful cohabitation of the different national groups possible and on an improved education of the working class – an aim which became one of the driving forces for the popular university movement. The workers as a new class developed large parts of their identity through their asscoiation with scientific and technological progress. However, in a society which was still very much dominated by the feudal classes, industrial progress was also one of the ways for the bourgeoisie to increase its economic influence and to get politically emancipated. Thus there prevailed a strong belief that both democratization and modernization were closely linked to the development and the spreading of scientific ideas.

After the First World War, the political situation stayed unstable, Vienna did not really manage to cope with the change in role from the capital of a huge empire to one of a small and weak nation-state, and the economic crises touched every domain, and of course also the academic sector. The living conditions had deteriorated definitively. For political and economic reasons but also due to increasing antisemitism, the scientist elite started to leave Austria. The beginning decline within the national science system was just but one additional sign for the breakdown of the whole structure of the society. Only the educational sector could still partly keep its high standards, a fact which was caused by the need for well-educated, leading personel in industry.

Science meets the public: identifying the spaces of communication

Having sketched so far the political, economic and social context that prevailed in Vienna between 1900 and 1938, we now want to identify the popularizers as well as the predominant places where popularized scientific knowledge was diffused to a wider public. As far as the authors of these popular accounts are concerned, it should be stressed that most of them were scientists. In Austria we could find no traces of professionalization in the domain of popularization of science, as this has been for example the case in France or in the United States. Neither science journalism started to evolve as an independent profession – and this is still not the case today – nor editors specialized in popular science books and magazines (as Flammarion in France) could be found.

As far as the places are concerned where scientific knowledge is popularized, four of them will be touched on here: the press, the popular universities, the public lecture series and the radio – the first two having the most important impact during this period. In all cases, scientists were the main popularizers.

For the 19th century as well as for the early twentieth century, *print media* (books, newspapers and magazines) constituted next to educational context of schools, one of the principal channels both for science news and for popular entertainment with science themes. Therefore, it seems promising to investigate the way science is presented in the contemporary newspapers in order to reveal the images of science that persisted. Generally speaking, mass media as instruments of education and entertainment of course contribute in shaping public beliefs and knowledge about all sorts of things. However, most influencial they became, as Marcel LaFollette (1990) stressed in her study on public images of science in the US, "when describing places, people and events outside their readers' everyday experience". And this is surely true for scientific research which was carried out by a small elitarian group of scientists inside universities, which were rather difficult to access. In 1910, only 6,000 students were accepted at university with 50% being at the faculty of law.

Of course, already the general development of the press in a national context reflected the important social, political and economic changes (Paupié, 1960). The breakdown of liberalism, the major political turn towards the end of the 19th century, led to a restructuring of the daily newspapers between 1880 and 1910. In parallel to the creation of modern political parties – social democrats, Christian socialists and German nationalists – we identify the rise of the importance of the respective newspapers, *Arbeiterzeitung*, *Reichspost* and *Deutsches Volksblatt*. All other newspapers, with the exception of the *Neue Freie Presse,* a traditional liberal daily newspaper of high international reputation, saw their readership dwindle. During the first decade of the 20th century, the politically oriented newspapers definitely took the lead with the *Arbeiterzeitung* selling about 54,000 copies in 1914. What we saw in the period up to 1914 was thus a "political diversification" which allowed a differentiated study of the science-politics relation.

After the First World War, the Austrian press found itself confronted with a completely changed political, social and economic situation. With the decay of the monarchy, the Viennese press lost large parts of its market and in parallel the local press started to take over an increasingly important role. But the press did not only lose in circulation but the quality of the content also suffered after 1918 – a development which particularly struck the "big press". The political press, quite on the contrary, experienced increased interest and reached circulation numbers as high as never before – an expression of the social and political instability. Science news is still very present in daily newspapers, and in particular the fundamental changes in physics belong to the regular features in the 20s and 30s.

With the end of the First Republic, also a number of radical national socialist newspapers started to invade the Austrian market and their treatment of scientific topics will provide an interesting sample for investigations.

Besides the newspapers, the popular universities (*Volkshochschulen*) became the most important places for the diffusion of scientific imformation to a wider public. Based on the fundamental social democrat concept of improving the educational conditions for the working class, they were founded in the end of the 19th century. It is, however, important to remark that the success of these educational establishments came out of the collusion of political and economic interests which led to the cooperative support by social democrats and the liberal bourgeoisie. Both groups – as already mentioned above – had a lively interest in an increasing level of industrialization and to ensure economic growth and therefore were aware of important role of science as well as of the urgent need of skilled workers.

What is more, with the Labour movement one has the ideal possibility to study the relation of social authority of science on the one hand and its ideological dimensions on the other hand. Bayertz (1983) has shown in his study on the way the German Labour movement how important the function of science and the impact of its dynamics were judged and how far these views were assimilated, theoretically in their "image of science". What he also demonstrated convincingly was the fact that Labour movement did not – as one could have imagined naively – fight their battle against science, but far more with and around science.

In Austria, however, the situation is particularily interesting, as these popular universities came to be not only an important place for the mediation and diffusion of scientific knowledge – if we are to believe the main protagonists – but an institution in which "the *living* science has found its place"(e.g., Zilsel, 1926). It thus became up to a certain extent a place of genuine scientific knowledge production, alternative to the universities. The laboratories installed in these popoular universities were partly better equipped than those at universities and new and revolutionary scientific concepts – as for example relativity theory or psychoanalyses – were taken up and diffused much faster than at the universities (Dvorak, 1985). This phenomenon was surely accentuated by the fact that the access to universities became increasingly difficult for some scientists for political but increasingly also for racial reasons.

Another important place of knowledge diffusion represented the *public lectures* generally held by well-known scientists, which were globally speaking very much "en vogue" in the late 19th and early 20th century. In the Austrian case, such series were organized and played an important role after the War and were meant to present new results, and were a mirror of the fundamental changes that were taking place. The general topics ranged from "Crises and Reconstruction in the Exact Sciences" organized by the Chemical-Physical Society to presentations of "Recent Progress in the Exact Sciences". Although during the period covered by us numerous lecture series were organized, one has to be aware of the fact that such fora were limited in both appeal and audience size. One way around this limitation of audience was the publication of accounts as well as critical disussions of these events in the daily press, which indeed happened in most cases.

Finally, *radio* programs should be mentioned as another new locus for popular science accounts, with the first show being broadcast on October 1, 1924. Against all expectations, the number of people holding a licence to receive transmissions reached 200,000 already in 1926 and half a million in 1932. However, the attitude of the press was rather hostile in the very beginning and therefore much effort was devoted to insisting on the "political neutrality" of the radio. Of course this meant that broadcasting general news became virtually impossible. Science news, however, seemed sufficiently neutral and therefore made its way into the radio programs. This neutrality had to hold for the scientific lectures, which were not

allowed to contain any ideological colouring, thus technical news and sometimes historical accounts were clearly preferable (Csoklich, 1983).

Popularization of science: motivations, aims and rethoric

However, not only the places where scientific knowledge is diffused to a wider public but also both the rethoric developed around the value and importance of "popular knowledge" as well as the general motivation and the aims that guide these efforts are to be taken into consideration. Indeed the interest in studying this period lies in the fact that we do not only have abundant popular science accounts, which generally contain little or no methodological self-reflection (see Jacobi and Schiele, 1988: 13), but we have a whole variety of documents dealing with the very process of popularization. The rethoric is large and would need subtle differentiation. Nevertheless, in order to convene some of the spirit of the discussion, let me mention a few examples for both of the rather conflictual counterpositions that were present.

In the beginning of the 20th century in Austria, one could say that popularization of scientific knowledge was still dominantly guided by the educational aspect. The encounter between science and popular education was only thought possible by the intermediary act of popularization. When looking, for example, at the *Enzyklopädisches Handbuch der Erziehungskunde* published in 1911, we find the rather general statement, that "popularization of knowledge in discourses and written documents is a very popular means for education, in particular, for adults (…). In our days popularization of science has made an important step forward, because scientists have put themselves at the disposition of spreading scientific knowledge to a wider circle of the public (…) One thinks that popularization of science contributes today as an effective means of improving the understanding of different classes and to bridge the gap between the educated and non-educated" (Knoll, 1981: 52). This is but an expression of a rather widespread idea, that it was social justice that was at stake when discussing raising the level of scientific literacy. Thus the importance that contemporary popularizers attributed to their tasks could be well-summarized by a moto coined in 1911: "Popular in expression, but scientific in content".

Another facet of the discourse we could trace in a letter from Marcelin Berthelot, French chemist and statesman, to Moritz Szeps, the initiator of the first weekly popular science journal in Austria "Das Wissen für Alle". Both put much weight in the essential advantage of a sustained popularization effort with a view to the important moral consequences this could have for the whole society. This was explicitly expressed in a letter from Berthelot to Szeps describing "science (as) an uncomparable school of moral honesty and modesty" becoming "like that a moral power" (Szeps-Zuckerkandl, 1939: 168).

Walter Benjamin gave another intersting variation to this theme in 1935: "(The popularizers of modern physics) involve the reader in the game and give him the certainty that he progresses. This certainty does not need to be linked to the content – no reader will have practical applications for relativity theory. But something else will be beneficial for him: with the knowledge he acquires a thought, that is new but not only for him" (Benjamin, 1935).

Thus for both Benjamin and Berthelot it was less the very detailed informations on science that seemed important to be diffused to a wider public but far more the global idea, the method of science.

However, at the same time we had an anti-scientistic movement and a strong vote against sustained popularization efforts from the side of the conservative and reactionary political forces. To express it in the words of Oswald Spengler: " All popular sciences are today right from the beginning valueless, failed and falsified sciences (...) One can judge the beginning decline of occidental science, which can be clearly felt, by its desire for a wider radius of action. The strict esotheric of the Baroque is felt as opressing, and this is an indicator for the decrease of distance between science and other domains (Spengler, 1923: 422).

Or to quote another very determined attack on the popular education movement: "The humanitarians and priests, who stood in for (popular education) were nothing but henchmen for capitalist industy, which demanded from the state, that he puts qualified workers at their disposition.(…) It was not a question to give way to a "written culture" or to emancipate human beings. Another kind of progress was meant. It consisted in taming the illiterates, this lowest class of human beings

(…) and to exploit not only the power of their muscles and their manual abilities but also their intellect" (Enzensberger, 1988: 65).

Thus the rethoric around this topic is indeed very large ranging from a naive positivistic to a hypercritical approach. What seems, however, interesting to remark is the fact that we find more or less explicit concern about the epistemological consequences the opening up of the sciences towards a larger lay-public could have (Knoll, 1981: 52).

Some closing remarks

From what we have outlined so far, some important facts can be derived and some first questions are raised, which will need thorough empirical investigations.

When looking at the three developments: industrialization, institutionalization and differentiation of the sciences and popularization of science, we have found in countries studied so far (e.g., Bayertz for Germany) a strong interdependence between them. In Germany, the development of the three domains even goes more or less synchronous. In the case of Austria, however, the development of the science system seems to be well ahead with regard to the degree of industrialization reached as well as the development of a popularization of science effort. The latter two only take off synchronously with the beginning of the century. A study of these different forces and their interdependence in the particular Austrian context therefore seems rather promising.

Further, it is interesting to retain that it needed a collusion of interests from divers-social groups within society to allow the development of a popular science movement. Indeed, both the bourgeoisie as well as the working class had strong interest, although out of different motives, to sustain the increase of scientific literacy. This fact also leads to the important question of whether or up to what degree politically different orientations entail necessarily different views on science. To study this question we will amply have the possibility due to the sample of newspapers with varying political orientation we have chosen.

Finally, it will be of great importance to investigate the reasons for the non-professionalization of the popularization of science and the consequences this had

for both the sciences as well as on the way science was perceived by a wider public.

Bibliography

Bayertz, K. 1983. Naturwissenschaft und Sozialismus: Tendenzen der Naturwissenschafts-Rezeption in der deutschen Arbeiterbewegung des 19. Jahrhunderts, *Social Studies of Science*, 13: 355-394.

Bayertz, K. 1985. Spreading the Spirit of Science, Social Determinants of the Popularization of Science in Nineteenth-Century Germany, in Shinn, T. & R. Whitley (eds.), Expository Science: Forms and Functions of Popularization. *Sociology of the Sciences*, IX: 209-227.

Benjamin, W. 1935(1972). Volkstümlichkeit als Problem. *Gesammelte Schriften,* Band 3. Frankfurt a.M.: Suhrkamp.

Bourdieu, P. and L. Wacquant. 1992. An invitation to reflexive sociology. Chicago: Universitz of Chicago Press.

Cloître, M. and T. Shinn. 1986. Enclavement et diffusion du savoir. *Informations sur les Sciences Sociales*, 25, 1: 161-187.

Csoklich, F. 1983. Presse und Rundfunk. In Weinzierl, H. & K. Skalnik (eds.), *Österreich neunzehnhundertachtzehn bis neunzehnhundertachtunddreißig*. Graz: Styria.: 715-730.

Dvorak, J. 1985. Wissenschaftliche Weltauffassung, Volkshochschule und Arbeiterbewegung im Wien der Zwischenkriegszeit. Am Beispiel von Otto Neurath und Edgar Zilsel, in H.J. Dahms (ed.): *Philosophie, Wissenschaft, Aufklärung: Beiträge zur Geschichte und Wirkung des Wiener Kreises*. Berlin: De Gruyter, 129-143.

Engelbrecht, H. 1986. *Geschichte des österreichischen Bildungswesens*. Band 4. Wien: ÖBV.

Enzensberger, H.M. 1988. Mittelmaß und Wahn. Gesammelte Zersteuungen. Frankfurt a.M.: Suhrkamp.

Fejtö, F. 1988. *Requiem pour un empire défunt: Histoire de la destruction de L'Autriche-Hongrie.* Paris: EDIMA.

Huber, W. 1983. Zur Geschichte der Wissenschaften. In Weinzierl, H. and K. Skalnik (eds.), *Österreich neunzehnhundertachtzehn bis neunzehnhundertachtunddreißig*. Graz: Styria.559-588.

Jacobi, D. and B. Schiele (eds.). 1988. *Vulgariser la science – Le procès de l'ignorance*. Seyssel: Champs Vallon.

Janik, A. and St. Toulmin. 1973. *Wittgenstein's Vienna.* London: Weidenfeld & Nicholson.

Johnston, W.M. 1972. *Österreichische Kultur- und Geistesgeschichte. Gesellschaft und Ideen im Donauraum 1848-1938*. Wien : Böhlau.

Knoll, J.H. 1981. Wissenschaft und Erwachsenenbildung: zur Problematik eines Dialogs. *Bildung und Erziehung* 34 (1) : 50-69.

LaFollette, M. 1990. *Making Science Our Own. Public Images of science 1910-1955*. Chicago: University of Chicago Press.

Paupié, K. 1960. *Handbuch der österreichischen Pressegeschichte*. Vienna: Braumüller.

Pollak, M. 1984. *Vienne 1900. Une Identité blessée*. Paris: Gallimard.

Schorske, C. 1980. *Fin-de-siècle Vienna; politics and culture*. New York: Knopf.

Spengler, O. 1923(1988). *Der Untergang des Abendlandes. Umrisse einer Morphologie der Weltgeschichte*. dtv.

Stadler, F. (ed.). 1982. *Arbeiterbildung in der Zwischekriegszeit. Otto Neurath- Gerd Arntz.* Wien/München: Löcker.

Szeps-Zuckerkandl, B. 1939. *Ich erlebte fünfzig Jahre Weltgeschichte*. Stockholm: Bernmann-Fischer.

Zilsl, E. 1926. *Die Entstehung des Geniebegriffes*. Tübingen.