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Genealogy of Chinese Perceptions of "Polluted Air":

Conceptual Change and the Terminological Landscape of Air Pollution in Modern China

Rune Svarverud*

Abstract

This article addresses Chinese concepts of air quality and air pollution by applying theoretical and methodological perspectives from the field of conceptual history, arguing for the relevance of these perspectives for the study of modern conceptual change in China, particularly in the period from the 1920s to the 1970s. By analyzing terms for the perceived relationship between air and health in Chinese discourse since the 1840s, a link can be made between conceptual changes and China's social history. Questions about air quality were first attached to ideas about modern hygiene, translated and transposed as knowledge from the West. Later smoke emissions from industry became part of the Chinese discourse on air and health, after which, in the 1970s, generic concepts

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of air pollution were popularized in China. With some modifications, the criteria developed as traits of modernity by Koselleck and other advocates of conceptual history are well suited to analyze conceptual shifts and modernity. This article argues that the period between the 1920s and the 1970s was a period of major conceptual transformation with regard to air and health in China and is found to demarcate a saddle period in Chinese conceptual history with regard to air pollution.

Keywords: air pollution, fresh air, smoke, hygiene, conceptual history

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中國「空氣污染」認知的知識譜系：

論近現代中國空氣污染的概念變遷與術語景觀

魯　納*

摘　　要

本文通過概念史領域的理論和方法論視角，論述中國空氣品質和空氣污染的概念，提出這些視角與中國近現代尤其是 20 世紀 20 年代至 70 年代思想變遷的研究密切相關。通過分析 19 世紀 40 年代以來的中國話語用哪些術語來認知空氣與人體健康的關係，本研究揭示了概念變化與中國社會史的聯繫。起初有關空氣品質的問題與現代衛生觀念有關，而現代衛生觀念也是一種從西方翻譯並傳播到中國的知識。之後工業氣體排放成爲了中國空氣和健康話語的一部分。20 世紀 70 年代以來，有關空氣污染的通用概念在中國日益流行起來。科塞雷克和其他概念史的宣導者提出了現代性特徵的標準，這些標準經過調整後，非常適合分析概念變遷與現代性的關係。本研究認爲，20 世紀 20 年代至 70 年代，中國的空氣和健康概念產生了巨大轉變，這段時期是中國空氣污染概念史上的「鞍形」期。

關鍵詞：空氣污染、新鮮空氣、煙、衛生、概念史

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Genealogy of Chinese Perceptions of "Polluted Air":

Conceptual Change and the Terminological Landscape of Air Pollution in Modern China*

Rune Svarverud

Introduction

She said, "look at this photo, what is that?" I said, "it is probably smog, how come I did not know?" She said, "check this out. The headline of the news that day was: 'Beijing capital international airport is experiencing the worst delays of airlines in years due to

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> fog' (*Xinhua net*, 2 December 2004)." At that time we all thought it was fog. We always referred to this as fog. So, when I saw this photo, formerly being a journalist, I felt responsible because during those years I always assumed I was reporting on incidents of pollution. I thought that pollution was associated with the sounds of explosions from mines or smoke from factory stacks. It had never occurred to me that for us, the people living in the center of large cities, the sky that we see every day—that is in fact pollution.[1]

The documentary film *Under the Dome*, from where this quotation is taken, released online in China in February 2015 (and soon after banned from all Chinese internet platforms), narrates a story of the conditions and potential health hazards of smog and air pollution in China.[2] In the film, the former Chinese journalist Chai Jing reveals the intimate relationship between the lived experience of pollution and the conceptual and terminological framework available to describe and make sense of such phenomena. The population in Beijing, and, in fact, in large parts of northern and eastern

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1 她說你看看這張照片吧，那是什麼？我說那應該是霾吧。那我怎麼不知道呢？她說你再查一下。當天新聞報導的標題：《北京首都機場因霧出現近年最嚴重的班機延誤》（2004 年 12 月 02 日 新華網）。那個時候我們一直認爲那是霧。我們一直把它叫做霧。所以看到這張照片，作爲曾經的記者，我的內心是有自責的。因爲那些年裡面我一直認爲自己是在報導各類的污染事件，但是我一直認爲好像我聽到礦山的炮響才叫污染，我看到工廠的煙筒才叫污染。我從來沒有想到過我們生活在都市中心的人，我們每天看到的天空，那就是污染。"*Chai Jing's Review: Under the Dome - Investigating China's Smog* 柴靜霧霾調查：穹頂之下 ," Accessed January 6, 2017, https://www.youtube.com/watch?v=T6X2uwlQGQM (18 min, 14 sec.)
All translations from Chinese in this article are the author's own.

2 For studies of the documentary *Under the Dome*, see e.g. Fan Yang, "Under the Dome: 'Chinese' Smog as a Viral Media Event," *Critical Studies in Media Communication* 33 (2016): 232-244.

China, had for years experienced hazy weather conditions, especially during winter months, and simply referred to it as *wu* 霧 (fog). Like Chai, very few people regarded the air as severely polluted and therefore hardly anyone was concerned with potentially negative health effects of that "fog." People associated the term "air pollution" with emissions from mines, factories and smoke stacks rather than the smog covering urban areas in most of northern China.[3]

The standard Chinese terms for air pollution, *kongqi wuran* 空氣污染, and atmospheric pollution, *daqi wuran* 大氣污染, have appeared frequently in the Chinese press since the early 1990s, and they refer mainly to emissions from the smoke stacks of production and industry sites,[4] polluting sources often located outside of China's large city centers. Urban citizens were not particularly concerned about the direct effects of air pollution on their lives and health until 2012, when the Chinese terms for smog, *wumai* 霧霾 or *mai* 霾, and PM2.5 were introduced and popularized with reference to ambient hazy air.[5] People in Beijing and

[3] A search in *People's Daily* (*Renmin ribao*《人民日報》) shows that articles on *wu* (fog), up to 2012 were concerned about visibility and effects on transportation and not on the potentially negative health effects of the hazy air. See for instance an article on fog and reduced visibility in Beijing and other cities in *People's Daily* January 11, 2012 ("Weilai yizhou buhui chuxian da fanwei bingdong zaihai wei lai" 未來一周不會出現大範圍冰凍災害, p. 9), and a CCTV web-article dated January 18, 2012 titled "Heavy fog visits multiple places in China," (Accessed January 17, 2017, http://english.cntv.cn/20120118/118310.shtml) From the pictures supplied with these articles, there can be no doubt that the scenes represent the polluted haze that would be referred to as *wumai* some months later.

[4] The number of titles of articles in the database *Quanguo baokan suoyin* 全國報刊索引 (www.cnbksy.net) containing the term "*kongqi wuran*" shows an annual frequency of 0-3 occurrences between 1971 and 1993, 5-44 between 1994 and 2002, and above 100 in 2003 and the years following. Similar figures are found for *daqi wuran*.

[5] The first occurrences of the term "*wumai*" in article titles in *Quanguo baokan*

other large cities in China's north and east, rapidly conceptualized the potentially negative health effects of polluted air in and around the cities.[6] Since 2012 concern over air quality and negative health effects caused by foul air has no longer been restricted to Beijing but has spread across the northern and eastern parts of China, also extending into the southern parts of the country.[7]

What have these and similar conceptual and terminological changes meant to people's experiences of air pollution in China? Are the actual physical experiences of air pollution independent of the conceptual framework used to designate the relationship between humans and their environment? My postulation in this exposition of the terminological landscape of polluted air in modern China, that is, the period following the Opium War, is that people use available terms and concepts vis-à-vis air pollution and related phenomena to make sense of their experiences of air pollution, and that their concern about the adverse health effects of poor quality air is directly affected by the relevant conceptual framework. The current Chinese discourse on smog, PM2.5, fresh and foul air, and health has as its backdrop, the historical discourse and conceptual history of air pollution. My aim is to describe the genealogy of Chinese perceptions of polluted air in modern China to better understand at what juncture(s) in modern history people in China began to conceptualize poor quality air

suoyin are from 2004. The number of articles with "*wumai*" in the title lies between 4 and 7 per year during the period 2004-2009, increases to 13 and 18 in 2010-2011, and then to 45 in 2012, and more than 750 in 2013 and the years following.

6 Xiaoyue Li and Bryan Tilt, "Public Perceptions of 'Quality of Life' vs. 'Environmental Quality' in Urban China: A Case Study on Smog in Tangshan City," *China Quarterly* 234 (2018): 340-356.

7 Mette Halskov Hansen and Zhaohui Liu, "Air Pollution, Science and the Search for Voice in Rural China," *China Quarterly* 234 (2018): 320-339.

and interpret its adverse health effects. I will then point to major shifts in Chinese perceptions of polluted air and thus contribute to a historicization of the current Chinese discourse on air pollution. To this end, I will engage theories of conceptual history.

Conceptual history and conceptual change in China

Debates on air pollution necessitate a set of terms describing incidents, ideas and concepts of polluted air and health effects. Indeed, a discourse on the relationship between air quality and human health will necessarily rest on a conceptual field and a number of key historical concepts, *Geschichtliche Grundbegriffe* (GG) as Reinhart Koselleck (1923-2006) termed them as part of his *Begriffsgeschichte*, his project on conceptual history. Beginning with a German lexicon of approximately 120 key modern concepts, a theoretical field of language, temporality, historical change, continuity and discontinuity, and social and political structures has developed as conceptual history.

Koselleck and his fellow proponents of conceptual history hold that following the Enlightenment at the end of the eighteenth century, political and social concepts in the German language went through a period of temporalization (*Verzeitlichung*) when key concepts in political and social language became more abstract, more general and less descriptive.[8] Temporalization of concepts also involved a shift from a circular to a linear vision of history where experience of prior events became irrelevant

[8] Reinhart Koselleck, "A Response to Comments on the *Geschichtliche Grundbegriffe*," in *The Meaning of Historical Terms and Concepts: New Studies on Begriffsgeschichte* (Washington DC: German Historical Institute, 1996), 61.

to future expectations and where the horizon of the future was open-ended. These temporalized concepts in the modern German-speaking world were in addition characterized by democratization (*Demokratisierung*), they were incorporated into ideologies (*Ideologisierbarkeit*) and characterized by politicization (*Politisierung*). By democratization, Koselleck meant the shift from political and social vocabularies being the monopoly of the elite to them becoming available and actively used by a much broader audience following the profound changes in eighteenth-century Europe with regard to literacy. In pre-revolutionary Europe, political and social concepts generally referred to very specific and particular conditions and privileges, whereas after the early eighteenth century these concepts became more general in their social and political references and more abstract in meaning, and hence took the form of ideologies and "isms." This is what Koselleck termed *Ideologisierung*. By politicization of concepts, Koselleck meant the fact that social groupings and constitutional identifications were fractured by revolutions, wars and major economic shifts, whereupon these concepts became used as weapons, or tools, in the political and social struggles between classes and other socio-political groups.[9] There is a watershed-like difference between the conceptual landscape of the pre-Enlightenment German-speaking world and that of the German-speaking world of the late eighteenth century, according to Koselleck. This period of change has become known as *Sattelzeit*, saddle period, sometimes also referred to as *Schwellenzeit*, threshold period, in conceptual history—the period from ca. 1750 to 1850 in German history.[10]

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[9] Melvin Richter, "Appreciating a Contemporary Classic: The *Geschichtliche Grundbegriffe* and Future Scholarship," in *The Meaning of Historical Terms and Concepts. New Studies on Begriffsgeschichte* (Washington DC: German Historical Institute, 1996), 12.

[10] Ibid., 11.

The proponents of conceptual history emphasize that while mainly focusing on single concepts or clusters of concepts, conceptual history in its entirety enables us to understand how change in a broad sense was conceptualized in eighteenth-century Germany/Europe: "It opens the way to understanding how those experiencing the historical formation of the modern world in German-speaking Europe conceptualized those great changes, incorporated them within their respective political and social theories, and acted upon these contested understandings."[11] Furthermore, the project *Geschichtliche Grundbegriffe* correlates political and social concepts with continuity and discontinuity of political, social and economic structures, utilizing both the history of concepts and structural social history.[12] As Richter writes, "Its program is anti-reductionist, posing the mutual interdependence of both types of history, which it sees as in a condition of fruitful, irreducible tension."[13]

What then is the relevance of conceptual change in Enlightenment Germany when our concern is the changing landscape of concepts of air pollution in China? On a general level, we can safely claim that there was a time in China when many, if not most, of the basic concepts of Europe's Enlightenment were translated, transformed, and appropriated to become the basic concepts of Chinese modernity. Its nascent beginnings lay in Jesuit translations of Enlightenment texts in the seventeenth and eighteenth centuries and developed on a larger scale with Chinese-Western cultural encounters and the proliferation of Western knowledge by Protestant missionaries in China after the Opium War (1839-40), gaining pace in the 1870s and 1880s. With Japanese influence after the first Sino-

[11] Ibid., 10.
[12] Ibid., 11.
[13] Ibid.

Japanese War (1894-95), the course of translations of important social and political sources took a new turn in the early years of the twentieth century.[14] With these extensive translation projects, followed the ever more daunting enterprise of establishing sets of Chinese vocabularies in all these new socio-political fields to carry the new conceptual fields. I concur with Koselleck in claiming that "the methods used in *Begriffsgeschichte* cannot be dismissed as applicable only to the analysis of any one language. On the contrary... comparisons are unavoidable because through translation every language incorporates borrowed words appropriated from foreign sources. This is especially true for basic concepts."[15] Many scholars have already engaged in the study of the conceptual change of basic concepts in Chinese, most notable a group of scholars in Taiwan and Hong Kong led by Jin Guantao (金觀濤) and Liu

[14] Federico Masini, "The Formation of Modern Chinese Lexicon and Its Evolution Toward a National Language: The Period from 1840 to 1898," *Journal of Chinese Linguistics: Monograph Series* 6 (1993):1-295; Lydia Liu, *Translingual Practice. Literature, National Cultures, and Translated Modernity - China, 1900-1937* (Stanford, California: Stanford University Press, 1995); Rune Svarverud, *International Law as World Order in Late Imperial China. Translation, Reception and Discourse, 1847-1911* (Leiden, Boston: Brill, 2007); Weigui Fang 方維規 , "'Anxingqi' yu gainianshi. Jianlun Dongya zhuanxingqi gainian yanjiu〈「鞍型期」與概念史：兼論東亞轉型期概念研究〉['Saddle Period' and Conceptual History: Research on Concepts during a Transitional Period in East Asia]", *Dongya guannianshi jikan*《東亞觀念史集刊》[Journal of the History of Ideas in East Asia] 1 (2011): 85-116; Liwei Chen 陳力衛, "Jindai Zhong-Ri gainian de xingcheng ji qi xianghu yingxiang〈近代中日概念的形成及其相互影響〉[The Formation of Concepts in Modern China and Japan and the Mutual Influence Between the Two]," *Dongya guannianshi jikan*《東亞觀念史集刊》[Journal of the History of Ideas in East Asia], 1 (2011): 149-178; Guowei Shen 沈國威, "Ciyuan tanqiu yu jindai guanjianci yanjiu〈詞源探求與近代關鍵詞研究〉[Investigation into the Origin of Words and Research on Modern Key Concepts]," *Dongya guannianshi jikan*《東亞觀念史集刊》[Journal of the History of Ideas in East Asia] 2 (2012): 263-282.

[15] Koselleck, "A Response to Comments," 69.

Qingfeng (劉青峰).[16] Conceptual history (*gainianshi* 概念史), *Sattelzeit* (*anxingqi* 鞍型期) and key concepts (*guanjianci* 關鍵詞) are no longer unfamiliar terms when analyzing the fundamental conceptual, structural and social changes that took place in China between the Opium War and the mid-twentieth century. The four criteria for recognizing a period of fundamental conceptual change established by Koselleck, *Verzeitlichung, Demokratisierung, Ideologisierbarkeit* and *Politisierung*, with some modifications, may fruitfully be applied to the social and conceptual changes in China during the latter half of the nineteenth century and well into the twentieth.

The study of the history of twentieth-century basic concepts in the German language is a recent addendum to German conceptual history, most notably promoted through Christian Geulen's seminal article in *Zeithistorische Forschungen* in 2010.[17] Geulen argues that the twentieth century was another *Sattelzeit/Schwellenzeit* in German history and proposes criteria for identifying traits of this saddle period. Geulen's article has spurred scholarly engagement, particularly in *Contributions to the History of Concepts*, where his enterprise is praised for its endeavors to expand Koselleck's theoretical framework and make it relevant for the late modern period, while also criticizing its deficiencies in taking into account different aspects and periods of conceptual change in twentieth-century Germany.[18] Willibald Steinmetz, alongside with Geulen, argues

[16] Guan-tao Jin 金觀濤 and Qing-feng Liu 劉青峰, *Guannianshi yanjiu. Zhongguo xiandai zhongyao zhengzhi shuyu de xingcheng*《觀念史研究：中國現代重要政治術語的形成》[Studies in the History of Ideas: The Formation of Key Political Terms in Contemporary China] (Hong Kong: The Chinese University Press, 2008).

[17] Christian Geulen, "Plädoyer für eine Geschichte der Grundbegriffe des 20. Jahrhunderts," *Zeithistorische Forschungen* 7 (2010): 79-97.

[18] *Contributions to the History of Concepts* 7, no. 2 (Winter 2012): 78-128.

for collaborative efforts to study basic concepts in twentieth-century Germany, in Europe and beyond and offers interesting new perspectives on Koselleck's criteria and components of the saddle period that appear relevant for our interest in conceptual change in modern China. Steinmetz argues that, in the German case, politicization and ideologization was set in motion around 1800 and have continued in waves in the twentieth century. In fact, politicization and ideologization extended further than in Koselleck's *Sattelzeit* and are defining features also of conceptual change in the twentieth century. In terms of democratization, however, Steinmetz argues that it had been more or less accomplished by the mid-nineteenth century and is less relevant as a feature of twentieth-century conceptual change. Geulen argues that the twentieth century is better characterized by popularization (*Popularisierung*), a quantitative change when these concepts entered mass media (and later audio-visual media) and became key concepts in modern self-consciousness. Geulen uses "*Umwelt*" (environment) obtaining universal value as a key concept of modern self-consciousness as an example of popularization.[19] Regarding temporalization, Steinmetz argues once again that the process was completed by the mid-nineteenth century and since then "concepts have been located on a time-scale between past, present and future.... I see no reverse movement; concepts continue to be used in a temporalized mode until today."[20] Thus, according to Steinmetz, only politicization and ideologization of Koselleck's four criteria can fruitfully be applied to studying German conceptual change in twentieth-century. In addition,

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[19] Geulen, "Plädoyer," 87-88.

[20] Willibald Steinmetz, "Some Thoughts on a History of Twentieth-Century German Basic Concepts," C*ontributions to the History of Concepts* 7, no. 2 (Winter 2012): 95.

Geulen has proposed four processes that characterize conceptual change in the twentieth century: scientization (*Verwissenschaftlichung*), popularization (*Popularisierung*), spatialization (*Verräumlichung*) and volatilization (*Verflüssigung*).[21] The latter two are not relevant in the case of China in the first half of the twentieth century, and popularization has been discussed above, leaving scientization. It is characterized by scientific concepts being taken up in the political and public sphere. Geulen uses "evolution" as an example of how a scientific concept has become part of political and public language and helped bridge the gap between different scientific disciplines and science cultures.[22]

Geulen and Steinmetz have proposed these criteria and new approaches in what is sometimes referred to as a new edition of conceptual history, or *Begriffsgescichte* 2.0,[23] in order to engage scholars in new and coordinated efforts within this field. Studying the conceptual landscape and conceptual change in Germany, the West and beyond in the twentieth century is still a scholarly enterprise in its infancy, both in theoretical sophistication and empirical investigations. The conceptual history of late nineteenth and early twentieth-century China may significantly contribute to this enterprise. Conceptual change in China between the Opium War and the middle of the twentieth century shows traits of a first saddle period in China, while also exhibiting certain attributes of twentieth-century conceptual change. This article will not engage with the complex question of conceptual change in modern China per se, but will draw on perspectives from both *Begriffsgeschichte* 1.0 and *Begriffsgeschichte*

[21] Geulen, "Plädoyer," 86-93; Steinmetz, "Some Thoughts on a History," 87-100.
[22] Geulen, "Plädoyer," 87.
[23] Alf Lüdtke, "History of Concepts, New Edition: Suitable for a Better Understanding of Modern Times?," *Contributions to the History of Concepts* 7, no. 2 (Winter 2012): 111.

2.0 by engaging with questions related to changing concepts of air, poor air quality, air pollution and health in modern China. My intention is to engage China scholars in a debate on conceptual change in twentieth-century China in light of these perspective from *Begriffsgeschichte* 2.0 and scholars of twentieth-century conceptual history in a broader global perspective.

Elsewhere I have described the terminological and conceptual changes involved in the modern Chinese translation of "air."[24] As a precondition for understanding how the changing quality of air influenced human life in Modern China, we first need to understand how ideas of air as a mixture of gases and carrier of other elements were introduced into China between 1849 and the early twentieth century. In this article, I shall address the terminological and conceptual changes involved when experiences of foul air and air pollution became part of social history in China. I intend to investigate the specific terminological landscape of air pollution in China prior to the development of generic terms for air pollution, and I shall also investigate the history of these generic terms. I begin by identifying the Chinese terms that were used historically for unhealthy, foul and polluted air. I then discuss the etymological history of these terms, and ask, in what way did the conception of polluted air change during the modern period? Can we identify a watershed period with regard to the Chinese terminology for air pollution? In order to address these questions, we need to engage with a relatively broad definition of air pollution.

[24] Rune Svarverud, "The Terminological Battle for 'Air' in Modern China," *Wakumon*《或問》26 (2014): 23-44.

What's in the air?

Today the English term "pollution" refers in the main to the degradation of the natural environment. That was, however, not the original and historically most frequent use of the term. The English word originates from the Latin word "*pollutionem*" meaning defilement, and the modern usage stems from twelfth-century French and fourteenth-century Middle English. The early English usage was associated specifically with non-coitus emission of semen and more generally with the moral and religious defilement of humanity.[25] This meaning held sway until the nineteenth century when it began to be used for environmental degradation. Following an awareness of the negative effects of specific forms of pollution in the US in the early nineteenth century, such as the contamination of water and air, specific terms such as "smoke," "noxious vapors," "corrupted" or "fouled air," "trade wastes," "industrial wastes," etc. were initially used, and "pollution" had not yet taken on the meaning it has today. But with the rapid industrialization and urbanization of the nineteenth century in the Western world, government institutions, experts and concerned populations in large cities became aware of environmental degradation, in particular of rivers, and, beginning in the mid-nineteenth century, started to refer to environmental degradation of any kind with the generic term "pollution." But it was not until 1924 that "pollution" was used for contaminated air in official US documents. During the environmental protection movements in the 1960s and 70s, environmental connotations of "pollution" became pervasive, and today "pollution" as a legal term, in political jargon, in environmental discourse, and in scientific

[25] Michael A. Champ, "Etymology and Use of the Term 'Pollution,'" *Canadian Journal of Fisheries and Aquatic Sciences* 40 suppl. 2 (1983): 5-8.

parlance, most commonly refers to environmental degradation.[26]

Our interest in the genealogy of concepts of air pollution in China requires a broader delineation of the term "pollution" than its current usage as we are to study ideas about pollution during a time before pollution was on the agenda and generic terms for it were formed in China. Various definitions and interpretations of pollution have been applied within academic, legal and political disciplines. John Copeland Nagle has discussed the definition of pollution in environmental law and found three alternative ways to classify it: 1) including any foreign entity that has been introduced to the environment, 2) listing pollutants or polluters, or 3) focusing on the effects of an alleged pollutant.[27] None of these or any other current definitions suit our purpose in this analysis. A guiding principle in environmental health science is that "the dose is the demon," signifying that a substance in the environment becomes a pollutant when the concentration increases beyond a certain threshold value. In our case, we are concerned with the perceptions of the relationship between air pollution and health effects as expressed in written texts. For this reason, "air pollution" in this article is understood as generally perceived poor quality air or airborne gases, droplets, particles or germs in the air in concentrations that are considered to be of nuisance to humans or to have a harmful effect on human health or on aspects of the environment. In the following analysis, this definition will be applied when demarcating terms and concepts to be included in this study of the changing conceptualization of "air pollution" in China.

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[26] John Copeland Nagle, "The Idea of Pollution," *UC Davis Law Review* 43, no. 1 (2009): 1-78.

[27] Ibid., 29-30.

From moral to environmental pollution: The history of a generic term

Below I examine the history of generic Chinese terms for "pollution" and "air pollution," which includes an inquiry into the period prior to this when more specific terms were used in the conceptualization of air pollution in China. Through a systematic study of glosses in dictionaries and an encyclopedia published between 1819 and 1995, a survey of articles on the environment and health, and an examination of the general historical public discourse on pollution in China during this period, I will establish and examine the contours of periods of conceptual shifts.

Current bilingual dictionaries of the Chinese language largely gloss "pollution" with the Chinese term *wuran* 污染 and vice versa. Early English-Chinese dictionaries, many of which were compiled by foreign missionaries in China already in the early nineteenth century, however, are less consistent when identifying Chinese equivalents for "pollution" and "pollute." Relevant terms complying with our definition above are *dianwu* 玷污 , *wuhui* 污穢 , *wudu* 污瀆 , *tuwu* 塗污 , *ranwu* 染污 , *nongzang* 弄髒 , and *nongwu* 弄污 , all indicating various forms of staining or making dirty. Only in English-Chinese dictionaries published in the 1970s and later do we also find the current term *wuran* for environmental pollution and the act of polluting. Chinese-English and Chinese-German dictionaries published from the early nineteenth century onwards largely confirm this terminological landscape.[28] The most common term for "pollute" and "pollution" in these dictionaries is "*wuhui*." In addition, other early common terms associated with physical and environmental pollution in

[28] Twenty-five bilingual Chinese dictionaries published between 1819 and 1995 have been consulted (see appendix).

these dictionaries are *wuzhuo* 污濁 and *wutu* 污塗 . In these dictionaries, the earliest appearance of the term "*wuran*" for pollution is found in *Mathews' Chinese English Dictionary* published in 1943. It appears again in Lin Yutang's *Chinese-English Dictionary of Modern Usage* (1972) and then in later dictionaries.[29]

An investigation of the Chinese encyclopedic dictionary *Cihai* 《辭海》(*Sea of Words*), published since 1936, substantiates the above analysis of terms for "pollution" in Chinese. Neither the 1936 Shanghai edition nor the 1968 Taipei edition of *Cihai* have entries on "*wuran*." In contrast, the 1965 Shanghai non-official edition and the later 1979 Hong Kong re-edition of this 1965 edition as well as the Shanghai 1979 edition and all later editions have extensive entries on "*wuran*" as "pollution."[30] So far, we can assume that "*wuran*" as a generic term for "pollution" had come into current use by 1965. Prior to that the term "*wuhui*" was the most common translation of "pollution" in bilingual dictionaries.

The term "*wuran*" was, however, not a neologism in the Chinese language in the 1960s. *Wuran* appears as a disyllabic term already in ancient Chinese texts, for example, in the dynastic history *Hanshu*《漢書》compiled in the first century CE, referring to clothes being stained by dirt and blood.[31] In the colloquial Buddhist text *Zutangji*《祖堂集》, complied, at least in part, in the tenth century CE, the word denotes human moral

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[29] R.H. Mathews, *Mathews' Chinese-English Dictionary* (Cambridge, Massachusetts: Harvard University Press, 1943); Yutang Li, *Lin Yutang's Chinese-English Dictionary of Modern Usage* (Hong Kong: The Chinese University Press, 1972).

[30] *Cihai* (non-official edition) (Shanghai: Zhonghua shuju 中華書局 , 1965), 1669; *Cihai* (Hong Kong: Zhonghua shuju 中華書局 , 1979a), 1: 1669; *Cihai* (Shanghai: Shanghai cishu chubanshe 上海辭書出版社 , 1979b), 2: 2032-2033.

[31] 出見男女不異路者，尊自下車，以象刑赭幡污染其衣。 Ban Gu 班固 , *Hanshu*《漢書》(Beijing, Zhonghua shuju 中華書局 , 1990) 99: 4164.

defilement.[32] From early on, the term "*wuran*" in Chinese literature both pointed to staining and coloring of physical objects and to human moral pollution. In the latter sense the term is frequently used in Buddhist texts when describing this-worldly defilement—how humans become tainted by the material world.[33]

This ancient Chinese term for human and physical defilement was infused with new semantic content as the modern generic technical term for environmental pollution both in China and Japan in the modern period. Terminological innovations in East Asia at this time often occurred first as Japanese lexical loans of concrete references in ancient Chinese applied to modern generic and abstract concepts. Due to close ideological, educational, and linguistic contacts between Japan and China after 1895, these lexical innovations found their way back into China with a new or modified semantic content, a process often referred to as Chinese return loans via Japan.[34] This is also the case with "*wuran*," or "*osen*" in Japanese.

The Japanese term "*osen*" 污染 was used in publications on environmental pollution earlier in Japan than in China, such as in Japanese books published in the early twentieth century dealing with the spread of germs

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[32] 即這個不汙染底，是諸佛之所護念。*Zutangji*《祖堂集》, *Foguang dazangjing - Chanzang*《佛光大藏經—禪藏》(Gaoxiong: Foguang 佛光 , 1994), 1/3, 172.

[33] *Hanyu da cidian*《漢語大詞典》(Shanghai: Shanghai cishu chubanshe 上海辭書出版社 , 1986-1993), 5: 911-912; *Zhongwen da cidian*《中文大辭典》(Taipei: Zhongguo wenhua daxue chubanshe 中國文化大學出版社 , 1990), 5: 896-897; William Edward Soothill and Lewis Hodus, *A Dictionary of Chinese Buddhist Terms with Sanskrit and English Equivalents and a Sanskrit-Pali Index* (London: Kegan Paul, Trench, Trubner & Co., Ltd., 1937), 216.

[34] Shown e.g. in contributions to the edited volume Michael Lackner, Iwo Amelung and Joachim Kurtz eds., *New Terms for New Ideas: Western Knowledge and Lexical Change in Late Imperial China* (Leiden: Brill, 2001).

causing illness.[35] Chinese texts dealing with pollution of water/liquids applying the term "*wuran*" began appearing in 1914 and gradually the use of the term increased in frequency in Chinese publications on pollution in the 1920s to 40s. After the CCP takeover in China in 1949, pollution did not receive much attention in publications in the 1950s and 60s, but the term "*wuran*" was again applied relatively frequently in the discourse on pollution of the environment beginning in the 1970s.[36]

The earliest Japanese text including a section dealing specifically with air pollution appears to be a school textbook on hygiene published in Tokyo in 1910.[37] The compound term "*kongqi wuran*" (air pollution) came into usage in Chinese medical journals in the late 1920s. This term, equitable to the term "*daqi wuran*" (atmospheric pollution), appeared more frequently in titles of newspaper and journal articles after 1971, with a manifest but still minute increase in frequency between 1994 and 2002. From 2003 until the present the number of journal and newspaper articles with "*kongqi wuran*" in the title has veritably exploded.[38] Given that the term "*wuran*" was not a frequently used term, sometimes even a contested one, for pollution during the period from the 1920s/30s to the late 1960s/ early 70s, we may keep open the possibility of other generative terms for air pollution being formed during this period. An investigation of relevant journal articles shows that the only term contesting the use of "*kongqi*

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35 Wasaburô Kakuyama 隔山和三郎 , *Kaisei densenbyô yobôhô yogi*《改正伝染病予防法要義》[Corrected version of Essentials for Protection against Infectious Diseases] (Osaka, Igyôkan 偉業館 , 1905).

36 Indications of the use of the term "*wuran*" can be deduced from occurrences in titles of articles in *Quanguo baokan suoyin*.

37 Shôyô Suruga 駿河尚庸 , *Saishin gakkô eiseigaku*《最新学校衛生学》[Latest version of Hygiene for Schools] (Tokyo, Tohôdô 吐鳳堂 , 1910).

38 Deduced from the number of occurrences of the term in titles of articles found in the database *Quanguo baokan suoyin*.

wuran" was "*wuzhuo kongqi*" 污濁空氣 (dirty air), used to denote air pollution in articles published in the 1930s and 1940s, systematically replaced by "*kongqi wuran*" and "*daqi wuran*" in the 1960s and 1970s.

To invoke Koselleck's conceptual history enterprise, this analysis of the terminological conditions related to pollution and air pollution in China indicates that the fifty-year period from the 1920s to the 1970s was a period of fundamental conceptual change with regard to air pollution. In the following I will further test this hypothesis by investigating the early terminological and conceptual landscape of more specific terms used for the contamination of air.

Concepts of polluted air in pre-industrial China

Modern, scientific ideas of air were brought to a presumably educated and interested elite in China following the Opium War. The idea that air was composed of a mixture of various gases was introduced in translations of foreign texts along with the principles of natural science, chemistry, and what was called aerology, or air science, (*qixue* 氣學) in the late 1840s. Readers of translated books on general science and chemistry, and of periodicals like *Yaquan Magazine* (*Yaquan zazhi*《亞泉雜誌》) and *The Chinese Scientific Magazine* (*Gezhi huibian*《格致彙編》), became acquainted with air as a composition of oxygen, nitrogen, carbon dioxide, water vapor, argon and other gases as well as solid matter in the form of coal and dust particles. "*Kongqi*," the Chinese term for "air," was established as such between 1849 and the first decades of the twentieth century. It is a combination of the term for empty, "*kong*" 空 , and the Chinese character

"*qi*" 氣 .[39] *Qi* constituted an essential element in Chinese cosmological and medical thinking by at least the third century BCE and is still an indispensable element in the theoretical framework of traditional Chinese medicine (TCM) and various Chinese healing techniques.[40] TCM teaches how to prevent various forms of heteropathic *qi* entering the body causing illness, all of these expressed through specific terms joined with the character "*qi*" (*xieqi* 邪氣 , *liqi* 癘氣 , *liqi* 戾氣 , *huiqi* 穢氣 , *yiqi* 疫氣). Chinese folk medicine also involves a concept of *zhangqi* 瘴氣 , similarly derived from *qi*, that resembles Western miasma theories describing how stagnant, decaying water emits smells and vapors into the environment and how these gases and vapors enter the human body and cause sickness and occasionally even death.[41] Various terms for dust and hazy air (e.g. *fengmai* 風霾 , *yutu* 雨土 , *chenmai* 塵霾 , *yinmai* 陰霾 , *yumai* 雨霾 , *wumai* 霧霾) have also been employed to describe inauspicious and obnoxious natural phenomena throughout Chinese history. Nevertheless, except for some attempts at bridging the theoretical gaps between TCM and Western medical theories in the late nineteenth and early twentieth centuries, none of these traditional concepts of foul *qi* have entered the modern Chinese discourse on air pollution.

With the growing awareness of the composition of air, of both life-

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[39] Svarverud, "The Terminological Battle for 'Air,'" 9.

[40] Elisabeth Hsu, "The Experience of Wind in Early and Medieval Chinese Medicine," *The Journal of the Royal Anthropological Institute* 13 (2007): S117-S118; Nathan Sivin, *Traditional Medicine in Contemporary China: A Partial Translation of Revised Outline of Chinese Medicine (1972) with an Introductory Study on Change in Present-day and Early Medicine* (Ann Arbor: Centre for Chinese Studies, The University of Michigan), 46-53.

[41] Ruth Rogaski, *Hygienic Modernity: Meanings of Health and Disease in Treaty-Port China* (Berkeley, Los Angeles, London: University of California Press), 76-87, 163.

giving components and potentially life threatening elements, concepts that fall within our definition of air pollution started to form in China prior to any knowledge of the perceived negative effects of air pollution from industrialization in China in the 1920s and 30s. The earliest single indication of the relationship between polluted air and negative health effects in the modern sense can be seen in the form of an illustration of a face mask used for coal dust (*getan xiqi* 隔炭吸氣) in a translated chemistry book published in Guangzhou in 1870, however not providing any further explanations on its use or effects.[42] A translated scientific text published in Shanghai in 1875-80 mentioned the effects of foul air on humans, discussed how dense and thin air affected the human body, and introduced the idea that excessive carbon dioxide in the air resulted in adverse health effects.[43] Other Chinese translations of Western chemistry books published in Shanghai in the 1890s mentioned the importance of the balance between oxygen and carbon dioxide for human health,[44] the importance of fresh air,[45] rain's cleansing effect of dust particles in the air,[46] the existence ozone (O_3) in the air,[47] and the effect of airborne nitric acid on plants.[48] School textbooks on chemistry published for the schools teaching a modern curriculum in China during the early years of the

[42] *Huaxue chujie*《化學初階》(*First Step to Chemistry*) (Guangzhou: Boji yiju 博濟醫局 , 1870), 1: 3b.
[43] *Gewu tanyuan*《格物探原》[A fundamental inquiry based upon the investigation of things] (Shanghai, 1875-1880), 6, 7a-8b.
[44] *Huaxue weisheng lun*《化學衛生論》[On chemical hygiene] (Shanghai: Gezhi shushi 格致書室 , 1890), 3b-4b, 5a-5b.
[45] *Gezhi qimeng*《格致啟蒙》[Primers for science studies] (Shanghai: Jiangnan Arsenal 江南製造局 , 1896), 5b.
[46] *Huaxue weisheng lun*, 10b.
[47] Ibid., 11a-12a.
[48] Ibid., 12a.

twentieth century also discussed foul air and introduced terms for it,[49] but generic terms had not yet been standardized. Instead, most of the terms referred to specific forms of foul and dirty air that potentially has negative effects on human health. Notions about the importance of clean and fresh air did, however, form a cohesive theoretical basis for deliberations on air hygiene, air pollution and health in early twentieth-century China, as we shall see below.

Air hygiene[50] as modernity

Innovative theories of hygiene, health and chemistry introduced into China in the 1880s, mainly from the West and later also via Japan, brought new insights to the interested Chinese public into the relationship between air quality and health.[51] After 1890, these ideas of personal and public hygiene (*weisheng* 衛生) served as a platform for making sense of particular forms and notions of foul and dirty air. After 1911 the main advocate of these perspectives on modern health and the environment was the Ministry of Education of the newly established republican state through its promotion of modern textbooks.[52] At this historical juncture, ideas

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[49] *Zuixin zhongxue jiaokeshu - Huaxue*《最新中學教科書—化學》[The Latest Textbook for Middle Schools - Chemistry] (Shanghai: Shangwu yinshuguan 商務印書館 , 1903), 66; *Zuixin huaxue jiangyi*《最新化學講義》[The Latest Lectures on Chemistry] (Shanghai, Tokyo, Zhili, Tianjin: Riben Dongjing liuxuesheng huiguan 日本東京留學生會館 and Wenmin shuju 文明書局 , 1905), 9.

[50] The term "air hygiene" has been employed in this article to denote all aspects of the hygiene movement in China that involved perspectives on air quality.

[51] Rogaski, *Hygienic Modernity*, 104-135.

[52] E.g. in 14 volumes of textbooks in moral education for Chinese primary schools approved by the ministry and published in 1911: *Gongheguo jiaokeshu - Xin xiushen*《共和國教科書—新修身》(Shanghai: Shangwu yinshuguan 商務印書館 , 1911).

and concepts of air hygiene went from democratization to popularization. Prior to the first formation of generic concepts of air pollution in China in the 1920s, air hygiene had become a modern, scientific framework for understanding how foul ambient air and poor quality indoor air affected personal health. Emerging ideas of air hygiene and health, as expressed in translations of foreign books and books and articles written in China during the pre-industrial period, can be categorized into three themes: clean and fresh air, dust in the air, and air as a carrier of pathogenic germs.

Air hygiene: Clean and fresh air

With the introduction of foreign knowledge on health and chemistry into China, the distinction between clean and non-clean air, and the importance of clean air for personal and public hygiene, was established as a framework for a public debate on air and health issues in the early twentieth century. The early conceptual framing of clean air as part of the discourse on modern hygiene is well illustrated in a series of semi-academic articles by Hua Hong (華 鴻) in a Chinese medical journal in 1908. The first article opens with the following passage:

> Air is a necessary substance for maintaining human life. Since this is common knowledge, we all want this indispensable air to be clean. If the air is impure, then it will not only be of no benefit, it will, in fact, be harmful. Therefore, the purity of air is directly related to hygiene.... Unclean air contains ammonia, carbon monoxide, nitric acid, sulphuric acid, hydrogen sulfide, dust, etc. There are numerous sources of unclean air. I will mention a few of the most important:
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> 1. Different kinds of dust,

2. Gases emitted from smoke stacks and factories,

3. Gases emitted from toilets and open sewage ditches,

4. Air that seeps through the ground,

5. Fires and lamps in private homes,

6. Stoves, fireplaces etc.,

7. Storage places where dust can collect,

8. Gas emitted from human breathing.

The main cause for indoor air being impure is the gas we emit when breathing. The reason is that after we breathe in air it oxidizes and becomes water vapor, carbon oxides and foul gases, after which these gases are emitted from the respiratory system. This must be brought to our attention when many people are gathered indoor in places like lecture halls, dormitories, military camps, hospitals, jails, theatres, etc.[53]

Hua Hong was here drawing from a Western knowledge system on modern hygiene and clean air. Towards the end of the nineteenth century, the quality of indoor air in British homes became a major issue among sanitary reformers in the UK. Concern was expressed about the accumulation of carbonic gases, depletion of oxygen, and the idea that re-breathed air would

[53] 空氣爲人類生活必需之要素，夫人而知之。顧吾人所需之空氣，純潔之空氣也。若污濁之空氣，則非徒無益而又害之矣。故空氣之純否，與衛生有直接之關係者也。……空氣之不潔者，尙含阿莫尼亞、一酸化炭素、亞硝酸、亞硫酸、硫化水素及塵埃等。空氣之所以不潔者，其原因甚多。今擇其主要者述之。（一）各種塵埃（二）煙突及工廠之瓦斯類（三）廁圊及不完全之溝渠中發生之瓦斯（四）自地中上昇之空氣（五）人家之燈火（六）竈及火爐等（七）塵埃貯積所（八）人類之呼氣。平時居室中空氣之所以不潔，大概係於吾人呼出之氣。因吾人吸入空氣之後，即酸化而成水蒸氣炭酸及有臭之氣體，再由呼吸器排出故也。故如學校之講堂、寄宿舍、兵營醫院、監獄、劇場等群集人眾之地。不可不注意之。 (Hua Hong 華鴻 , “Kongqi” 〈空氣〉 - Die Luft [Air],” *Yiyao xuebao*《醫藥學報》10 (1908): 116-117.)

contain waste-poisons from human breath. The circulation of outdoor air, in particular through small rooms with many people and a limited volume of available clean air, was seen as essential to good health.[54] The early general discourse on clean air in Chinese periodicals commenced around 1906 with a reference to the situation caused by industrialization in big European metropolises like London.[55] Soon, however, the debate turned inward to the Chinese situation and indoor air quality in Chinese homes, focusing on how clean indoor air could be maintained through good circulation of outdoor air, a debate that continued in China into the 1920s and 30s.

In this early Chinese discourse on air and health, clean air was referred to as *chunjie kongqi* 純潔空氣 or *qingjie kongqi* 清潔空氣 , and words meaning unclean, foul or filthy air were also coined: "*bujie kongqi*" 不潔空氣 formed by the prepositioned negation *bu* (不) and "*wuzhuo kongqi*" 污濁空氣 (occasionally also referred to as *zhuoqi* 濁氣). The early focus on clean air and specific elements that polluted, as described by Hua Hong, shifted to the principles of fresh air (*xinxian kongqi* 新鮮空氣 , sporadically also termed *qingxian kongqi* 清鮮空氣).

Ideas about fresh air were introduced to China in 1916 through articles translated from English,[56] conveying stories of people suffocating

[54] Stephen Mosley, "Fresh Air and Foul: The Role of the Open Fireplace in Ventilating the British Home, 1837-1910," *Planning Perspectives* 18 (2003): 1-21; Stephen Mosley, "The Home Fires: Heat, Health and Atmospheric Pollution in Britain, 1900-45," in *Health and the Modern Home*, ed. Mark Jackson (Routledge: New York, 2007), 196-223.

[55] "Qingjie kongqi"〈清潔空氣〉[Clean air], *Wanguo gongbao*《萬國公報》[A Review of the Times] 215 (1906): 87.

[56] S. L. Chang, "Xinxian kongqi〈新鮮空氣〉[Fresh air]," *Yingyu zhoukan*《英語週刊》[English Weekly] 52 (1916): 1328-1331; F.S. Lee, "Xinxian kongqi zhi yanjiu〈新鮮空氣之研究〉[Research on fresh air]," *Kexue*《科學》[Science] 2, no. 3 (1916): 281-299 , translated from the American journal *The Popular*

in small, enclosed rooms with no circulation of fresh outdoor air. In 1918 these articles were followed by a native Chinese article explaining the necessity of keeping doors and windows open to let in fresh air when people gathered in small, enclosed rooms heated with open fires and stoves.[57]

The Chinese debate on fresh air gained momentum around 1930 and attention was turned to the health-giving fresh air of rural China. A student magazine article published in 1930 defined fresh air as the natural composition of gases and particles that were found in outdoor air in the country. Air turns foul with depletion of oxygen and increasing carbon dioxide levels in closed rooms with many people, and for this reason, the article explained, air in a crowded city would be less fresh than in the sparsely inhabited countryside. So, the advice to China's middle-school students at the time was to frequently let outdoor air flow through their quarters and to regularly take walks in fresh country air.[58] In the 1930s, children and men and women of all ages were inspired by modern science and encouraged by health authorities and through school textbooks to open their windows and doors, preferably install air vents in their modern homes, take walks in nature, and breathe deep when exposed to fresh outdoor air.

Air hygiene: Dust in the air

Historically, dust in the air in China appeared in two discursive domains,

Science Monthly (April 1914).

[57] Su Qingxin 蘇清心, "Xinxian kongqi zhi jinyao〈新鮮空氣之緊要〉[The importance of fresh air]," *Shizhao yuebao*《時兆月報》12, no. 12 (1918): 19-21.

[58] Zhijue 之覺, "Xinxian kongqi heyi zhongyao〈新鮮空氣何以重要〉[Why fresh air is essential]," *Zhongxuesheng zazhi*《中學生雜誌》11 (1930): 4-6.

one was outdoor dust and sand storms, the other was dust in indoor air. Both of these were, to varying degrees and at different times, related to health and hygiene.

Dust storms (variously termed *fengsha* 風沙 , *heifengbao* 黑風暴 , *fuchen* 浮塵 , *yangsha* 揚沙 , *shachenbao* 沙塵暴 , *shabao* 沙暴 , and *chenbao* 塵暴) in the northern parts of China are natural phenomena well documented in Chinese historical sources, in particular in local historical gazetteers.[59] However, they were not incorporated into the hygiene discourse in China. Until the 1970s, sand and dust storms as natural phenomena did not figure prominently in the Chinese public discourse. These storms spurred scientific debates in China during the 1990s, in particular after a serious sand storm in Gansu in 1993, but it did not enter into the public debate on dust and health.[60] It was only in the first decade of the twenty-first century that the Chinese public discourse on urban air quality began to include questions related to the adverse health consequences of sand and dust storms, such as their being declared health killers (*jiankang shashou* 健康殺手) in 2009.[61] Dust particles in indoor air, *chen'ai* 塵埃 , on the other hand, have a much longer history in the Chinese discourse on air hygiene.

"*Chen'ai*" is an ancient Chinese disyllabic term that refers to dust

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[59] Scientists and historians have been able to identify 1,100 recorded occurrences of dust storms over a period of 1,700 years and reconstructed their severity and fluctuations. Q. Feng, K.N. Endo and G.D. Cheng, "Dust Storms in China: A Case Study of Dust Storm Variation and Dust Characteristics," *Bulletin of Engineering Geology and the Environment* 62 (2002): 253-261.

[60] This assumption is based on the number of occurrences of the term in titles of articles found in the database *Quanguo baokan suoyin*.

[61] Susanne Stein, "Von Schwarzen Stürmen und Gelben Drachen. Sand- und Staubstürme in der Volksrepublik China zwischen Expertendiskurs und Alltagswissen, 1979-2011," *Geographische Revue* 2 (2012), 100-101.

as particles. Extending from the semantics related to dirt and dust in the physical world, the term has also frequently been applied in texts to describe this-worldliness, defilement and debasement.[62] There are no indications that "*chen'ai*" was associated with negative health effects in pre-modern usage. In modern Chinese periodicals, however, "*chen'ai*" took on a new meaning when it became attached to scientific notions of air quality. The debate on dust in indoor environments, introduced in a 1903 article in the magazine *Dalu*《大 陸》, commenced with considerations of the concentration of dust particles in the air in different geographical locations. This article concluded that humans should spend hot summer days in the mountains rather than in the lowlands because of the lower concentrations of dust in the air.[63] A 1905 article in the same periodical introduced an investigation of air quality in Berlin, with its main focus being the potential effects of germs attached to dust particles.[64] These two articles marked the beginning of a Chinese debate on the harmful health effects of dust in the air. Another article from 1913 opened with the following passage that serves as an example of the discourse on indoor air quality that it introduced: "Dust is the wings of germs and a medium for the transmission of diseases. Scientists frequently speak of its harmful effects. Anyone who has the slightest concern for hygiene knows that the elimination of dust is among the most urgent tasks."[65] In articles written

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[62] *Hanyu da cidian*《漢語大詞典》(Shanghai: Shanghai cishu chubanshe 上海辭書出版社 , 1986-1993), 2: 1194.

[63] "Kongqizhong zhi chen'ai〈空氣中之塵埃〉[Dust in the air]," *Dalu*《大陸》3 (1903): 8.

[64] "Boling zhi chen'ai jianchafa〈伯靈之塵埃檢查法〉[Surveillance of dust in Berlin]," *Dalu*《大陸》14 (1905): 4-5.

[65] 塵埃爲微菌之羽翼，傳疾之媒介，科學家屢言其害。稍知衛生者，莫不以掃除塵埃爲亟物。"Chen'ai zhi gongyong〈塵埃之功用〉[Functions of dust]," *Jinbu*《進步》3, no. 6 (1913): 111.

after the 1920s on the adverse effects of dust in the air, it becomes clear that "*chen'ai*" got attached to the discourse on air hygiene and blamed for many different human respiratory ailments, circulatory diseases, the spread of many illnesses through germs, and premature deaths. From 1920 to the 1940s, the Chinese discourse on public and private hygiene fully incorporated indoor dust, *chen'ai*, as a major health concern, and these perspectives were popularized through public school text books.

Air hygiene: Air as carrier of pathogenic germs

A particular branch of the discourses on clean air and dust in China attached great importance to the presence of infectious microorganisms and germs in air. Modern germ theory was introduced into China from the West via Japan during the first decade of the twentieth century and gradually gained importance in medical circles in China from the 1910s to the 1930s.[66] In the first decades of the twentieth century, germ theory was informed by the discussion of air quality,[67] and a prolific Chinese public discourse on germs and air quality commenced in the mid-1920s. An article translated from an American engineering magazine in 1926 explained how microorganisms (*weishengwu* 微生物) attached to tiny dust particles which were carried with the wind and mixed into the air. According to the article, most of these microorganisms in the air were harmless to humans, only organisms that originated from the intestines

[66] Bridie J. Andrews, "Tuberculosis and the Assimilation of Germ Theory in China, 1895-1937," *Journal of the History of Medicine and Allied Sciences* 52, no.1 (1997): 114-157; Ruth Rogaski, *Hygienic Modernity*, 173.

[67] See Diji Fan 范迪吉 , ed., *Putong baike quanshu*《普通百科全書》[Common encyclopedia]. (Shanghai: Huiwen xueshe 會文學社 , 1903), 88: 5b-6a; and *Xinzhuan huaxue jiaokeshu*《新撰化學教科書》[New Textbook on Chemistry] (Shanghai: Shangwu yinshuguan 商務印書館 , 1913), 16.

of animals and the mouths and noses of humans could be infectious and spread diseases. Germs (*weishengchong* 微生蟲) in the air were the most harmful among these microorganisms.[68] Knowledge about the presence of infectious germs in air also reached student circles, which is illustrated by a short exposition in a student journal in 1926:

> Our most vital thing is air. If there were no air, we would not be able to live. So, air and human life are closely related, but the air has to be clean. If it is not clean, it may disseminate germs and harmful poisonous substances. These are invisible killers, even more fatal than water, fire, swords and soldiers.[69]

By the late 1920s, it was generally recognized that infectious germs (*bingjun* 病菌) transmitted certain diseases through air and that ventilation (*liutong* 流通 , *tongfeng* 通風) of fresh air through living quarters was the best way to avoid the spreading of these diseases.[70]

During the 1930s the importance of being exposed to sunlight was also emphasized as a part of this movement of fresh-air-against-germs. A journal article published in 1933 explained further that if a person was not exposed to sunlight for a month or more (s)he could contract diseases or even die, the main reason being that dark and humid spaces with no

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[68] "Kongqi yu rensheng jiankangshang zhi guanxi〈空氣與人生健康上之關係〉[On the relationship between air and human health]," *Zhonghua gongchengshi xuehui huibao*《中華工程師學會會報》13, no. 1 (1926): 13-14.

[69] 我們最要緊的東西是空氣。假如沒有空氣，我們就不能生活。所以空氣和人生是有極大的關係。但是空氣又要清潔。假使不清潔，就要傳播微生蟲，和有害的毒質，是無形的殺人，比水火刀兵還要激烈啦！ Deyan Ge 葛德炎 . "Kongqi he rensheng de guanxi〈空氣和人生的關係〉[On the relationship between air and human life]," *Xuesheng wenyi congkan huibian*《學生文藝叢刊彙編》3, no. 1 (1926): 484.

[70] See "Kongqi yu rensheng〈空氣與人生〉[Air and human life]," *Zhongguo weisheng zazhi*《中國衛生雜誌》(1931): 65-66.

sunlight were breeding grounds for germs. Therefore, urban dwellers should do like peasants, expose their arms and upper body to sunlight, and then their blood would stay clean, germs would be eliminated, and they would be healthy like peasants and the people living in the countryside.[71] As we can see, these theories on air and hygiene resembled both Chinese and Western miasma theories and were probably stimulated by these traditional ideas on health and the environment.

Terms for all these fields of new knowledge in China on hygiene, health and air formed and stabilized during the first decades of the twentieth century and developed a new conceptual field of air pollution in pre-industrial China. "*Weisheng*" for "hygiene" and "*chen'ai*" for "dust" are ancient Chinese terms that were transformed into abstract concepts of air hygiene in the early decades of the twentieth century. Additionally, a number of neologisms in Chinese were applied, mostly borrowed from Japan, to denote aspects of this conceptual field.

Industrial smoke as air pollution

Smoke and emissions from industry and heating stoves also represent an early chapter in the conceptual history of air pollution in China. According to historian of science Wang Yangzong, industrialization in China prior to 1949 can be divided into four stages: 1) beginning phase of industrialization 1861-1895, 2) developmental stage of industrialization 1896-1927, 3) peak in pre-1949 industrialization 1928-1937 and 4) decline of industrial production caused by the Japanese invasion and civil war 1938-1949. The first signs of industrial air pollution in China were noted in reports about

[71] Gui Hong 歸鴻 . "Riguang kongqi yu rensheng〈日光空氣與人生〉[Sunlight, air, and human life]," *Shuowang banyuekan*《朔望半月刊》8 (1933): 20-21.

production in the coal and metal mining industry in the 1880s and later also about the textile industry. Ambient air pollution in the form of smoke emissions from industry became a palpable environmental problem in some Chinese cities caused by growing industrialized production in the 1920s. Japan rapidly developed local industry in China in the 1920s and 30s, in particular in Manchuria after the Japanese takeover in 1931, and air pollution caused by coal smoke (*meiyan* 煤煙) became a social and political issue. In cities like Dalian, Shenyang, Harbin and Changchun, local authorities established committees to work with smoke problems, and abatement measures were taken beginning in 1935, with relative success in improving air quality.[72]

Smoke, smog, soot particles and air pollution from industry and heating stoves were first reported in the Chinese press as problems caused by industrialization and urbanization in large Western European and North American metropolises like London, Manchester, Leeds, Glasgow, Paris, Los Angeles, and the Ruhr area in Germany. This pollution in foreign countries was usually described by terms like "smoke" (*yan* 煙 , *yanwu* 煙霧), "coal smoke" (*meiyan*), "dense fog" (*dawu* 大霧), or simply "fog" (*wu* 霧) in the Chinese press and periodicals. Reports on deteriorating air quality, using all of these terms in describing air pollution and smog, appeared in Chinese periodicals in the 1870s.[73] Beginning in the mid-1920s, articles in Chinese periodicals began to address more general problems

[72] Yangzong Wang 王楊宗 , "Jindai gongye de jianli yu huanjing wenti〈近代工業的建立與環境問題〉[The establishment of modern industry and environmental problems]," in *Zhongguo huanjing baohu shigao*《中國環境保護史稿》[Historical essays on environmental protection in China], eds. Guihuan Luo 羅桂環 et.al, (Beijing: Zhongguo huanjing kexue chubanshe 中國環境科學出版社 , 1995), 301-330.

[73] Hongtao Li and Rune Svarverud, "When London Hit the Headlines," *China Quarterly* 234 (2018): 357-376.

related to the environment and human health caused by smoke emissions from industry, while other articles addressed concrete pollution issues in industrializing Chinese cities. These articles unequivocally applied the term for coal smoke, "*meiyan*," when addressing these rising problems in China.[74] The early concrete reference of *meiyan* to smoke from burning coal had become an abstract term for industrial air pollution in China in around 1925.

The aspects of air pollution that most often are associated with modern industrial air pollution, namely smoke emitted from industrial production did not, however, occupy a very prominent place in the early Chinese historical discourse on air quality. Smoke problems, systematically referred to as *meiyan* (coal smoke) caused by industrial production were local in their consequences and mostly unheard of in wider society in the 1920s. Air hygiene seems to have been far more important to Chinese citizens in the 1920s and 30s.

Conclusion: Social history and conceptual change in modern China

This exposition of the terminological landscape of air pollution in modern China has demonstrated an intimate relationship between social history and conceptual change. A number of historical junctures in the way China viewed air in the period following the Opium War (1839-40) were accompanied by conceptual shifts. It all started with the introduction of "aerology" from the West shortly after the Opium War, as a direct result of the foreign presence in China. Air (*kongqi*) as a composition of several

[74] Deduced from a search in the *Quanguo baokan suoyin* database.

gases and other elements, and the relationship between these elements and human health became an essential part of the knowledge system that challenged traditional medical knowledge in the latter half of the nineteenth century.

The attraction in China to the Western modern science of health was followed by an interest in and a series of translation of texts on hygiene (*weisheng*) in the late nineteenth century on the part of a few intellectuals and scholars interested in foreign knowledge and modern science. With the establishment of public schools for many young Chinese and the institutionalization of public health care in the early twentieth century, however, this new knowledge became mainstream as it was used to supervise personal and public health. Within this knowledge system, air quality became an essential element in managing health work and disease control in schools and in society at large. Three qualities of air were interpreted as essential for the maintenance of good health: the air must be clean and fresh, the air should be without excessive dust particles, and the air should be free from pathogenic germs. These concepts of healthy, unpolluted air were associated with a number of new terms, often imported terms from Japan. Some of these were ancient Chinese terms that were infused with new semantics in Japan and returned to China in the early twentieth century, others were lexical innovations in Japan imported into China. A prolific discourse on clean, fresh, unpolluted and healthy air commenced in the early years of the twentieth century and flourished in China from the 1910s to the late 1940s. Urban air was further rebuffed as unhealthy given the growing industrialization in China in the 1920s, and emissions from industry and other urban polluting sources were subsumed under the term "*meiyan*" (coal smoke) illustrating the close link at this juncture between conceptual change and social history.

A generic term for pollution (*wuran*), and hence also for air pollution (*kongqi wuran*), appeared in China as a return loan from Japan in the early twentieth century. These terms were only used in relatively narrow scientific circles, often also contested by other generic terms for pollution, until the 1970s. This conceptual study of terms for generic terms for air pollution has shown that the formative period for generic conceptualization of pollution in China lies in the fifty-year period between the 1920s and the 1970s, closely associated with increasing levels of air pollution from various polluting sources in China. After the 1970s, generic concepts of air pollution became more widely used in society. "*Kongqi wuran*" (air pollution) and "*daqi wuran*" (atmospheric pollution) were, however, still very much attached to industrial production and not associated with pervasive air pollution later recognized as *wumai* (smog) in large parts of northern and eastern China. That conceptual shift was still happening as late as 2012.

My aim in this article has been to probe beyond these generic concepts and scrutinize the modern conceptual landscape and historical shifts related to health and air quality in a broader sense. Key terms for specific forms of air pollution came into use in China in the early twentieth century, mainly from the 1920s—"*xinxian kongqi*" for fresh air, "*chen'ai*" for dust, "*weishengchong*" and other Chinese terms for germs, and "*meiyan*" for industrially emitted air pollution— and marked major shifts in how air quality and health were conceived. The discourse applying these key terms for specific forms of air pollution indicate a process of temporalization when concrete meanings of terms became more abstract in the discourse. In line with a process of temporalization, we can safely assume that prior experience with air quality had become obsolete for those concerned with clean air from the 1920s onwards—history and self-

consciousness was pointing forward in time and not backward. These terms became democratized by their widespread use in the flourishing Chinese public discourse and through general primary education. Considering the widespread social engagement with these questions in the debates of the 1920s and 30s, we may even speak of popularization in Geulen's sense rather than simply a process of making elite terminology available to a broader audience defined as democratization by Koselleck for the early *Sattelzeit*. On par with how *Umwelt* obtained universal value in the twentieth-century German speaking world, "*xinxian kongqi*" (fresh air) took up the central stage in conceptions about healthy air in China in the first half of the twentieth century. Steinmetz argues that politicization and ideologization have continued in waves in Germany even after Koselleck's *Sattelzeit* and that these are defining features of conceptual change also in the twentieth century. Concepts of air quality and health were at some level politicized, and possibly even ideologized, in China as poor quality air was linked to the political and ideological movements of education and hygiene, *weisheng*. With regard to Steinmetz' criteria for a process of scientization, we see unambiguously how the entire public discourse on fresh air, foul air and hygiene, including school text books directed at young students, was permeated by modern science. Conceptual change in twentieth-century China, at least in the field of air quality, hinged on modern science; concepts from modern science became part of public and political language.

These sources and analyses show clearly that the fifty-year period starting from the 1920s was a period of fundamental conceptual change and constitutes a *Sattelzeit* for conceptual change regarding air quality, health and air pollution in China. Other conceptual shifts have occurred since the 1970s with regard to a broad public generic conceptualization

of air pollution and around 2012 with the current Chinese concern about the health risks attached to ambient smog. By employing perspectives from *Begriffsgeschichte* 1.0 and 2.0, we see that conceptual change in twentieth-century China carries traits of both the periods of *Sattlezeit* in German conceptual history. Further systematic studies of conceptual change in many more fields in twentieth-century China, employing these theoretical perspectives, would help to better map the Chinese case and more appropriately engage with criteria for a Chinese *Sattelzeit—anxingqi*.

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