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The Beginning of the End of the Bacteriological Paradigm in the Japanese Empire

–Space of Experience, Path Dependencies, and Generations as Factors in Conceptions of Japanese Experts about the 1918-1920 Influenza Pandemic–

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Presented in fulfilment of the requirements for the degree of
Master of Arts in Japanese studies

Supervisor: Prof. Dr. Jan Schmidt

Academic year 2020-2021

209,489 characters

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I hereby declare that, in line with the Faculty of Arts' code of conduct for research integrity, the work submitted here is my own original work and that any additional sources of information have been duly cited.

Het Begin van het Einde van het Bacteriologische Paradigma in het Japanse Imperium

–Ervaringsruimte, Padafhankelijkheid, en Generaties als Factoren in de Opvattingen van Japanse Experts over de 1918-1920 Influenza Pandemie–

De influenza pandemie van 1918-1920, beter gekend als de "Spaanse griep", werd tijdens de huidige COVID-19 crisis vaak aangehaald als de laatste grootschalige pandemie. Toch blijft de kennis over de wereldwijde impact van deze pandemie vaak oppervlakkig, omdat de studie ervan zich bevindt op de kruising van historisch en medisch onderzoek. Deze thesis heeft als doel een beter begrip te krijgen van de "Spaanse griep" door vanuit een geschiedkundige invalshoek de medische experts en hun bedenkingen te bestuderen in hun eigen temporaliteit. Aan de hand van een analyse van 24 academische artikels over de epidemische influenza die gepubliceerd werden in Japanse medische tijdschriften door experts, gaat deze thesis na hoe ervaringen uit het verleden invloed hadden op de discoursen in de teksten, om zo de verschillende meningen over de oorsprong van, en remedies tegen de griep te verklaren.

Het type A influenza virus H1N1 dat de influenza pandemie van 1918-1920 veroorzaakte, leidde wereldwijd tot 20 à 50 miljoen doden. Ook in Japan verspreidde de pandemie zich in drie opeenvolgende golven, resulterend in een mortaliteit van 0.89% van de toenmalige bevolking. Als preventieve maatregel werd onder andere een vaccin aangeraden door het Sanitaire Bureau van het Ministerie van Binnenlandse Zaken. Maar omdat de oorzaak van de griep nog onbekend was tijdens de pandemie, tastte de medische wereld, die vooral gefocust was op bacteriologisch onderzoek, in het duister en werden er experimentele vaccins ontwikkeld zonder dat er een wetenschappelijke eensgezindheid was over de oorzaak van de ziekte.

De analyse in deze thesis is tweeledig. Het eerste deel onderzoekt de "ervaringsruimtes" van twintig Japanse medische experts die een artikel schreven over de Spaanse griep tussen 1918 en 1926. Dit theoretische concept van Duitse historicus Reinhart Koselleck werd aangevuld met theorieën over "communicatief geheugen", historisch institutionalisme, paradigma's, en het concept van "generatie". De analyse wees uit dat de auteurs gemeenschappelijke ervaringen hadden: ze maakten dezelfde ontwikkelingen in het medische veld mee en de meesten studeerden een tijdje in Europa. Aan de andere kant verschilden de auteurs ook: ze behoorden tot verschillende

academische instituten en tot verschillende generaties die de vorige pandemie van 1889-1890 al dan niet bewust hadden meegemaakt.

Het tweede deel van de analyse is een discoursanalyse, volgens de theorie van Norman Fairclough zoals herwerkt door Marnix Beyen, van 24 academische artikels die de experts in de vroege jaren 1920 schreven over de griepepidemie. Hieruit bleek dat er in het Japanse medische veld vier verschillende opvattingen te onderscheiden waren: volgens 6 artikels was de oorzaak het Pfeiffer bacillus, volgens 1 artikel was het een filtreerbaar organisme, 5 artikels twijfelden maar zagen het Pfeiffer bacillus als een mogelijke oorzaak, en ten slotte waren er 8 artikels die op complicaties focusten en de discussie over de oorzaak van de ziekte als onaf beschouwden.

Zo bleek dat de “Spaanse griep” een katalysator was voor verdere ontwikkelingen in microbiologisch onderzoek en dat terwijl het bacteriologische paradigma afbrokkelde, zowel experts met verschillende achtergronden, als met gelijkende achtergronden, het niet eens konden worden over de exacte oorzaak of preventieve maatregelen tijdens de pandemie.

大日本帝国における細菌学パラダイムの終わりの始まり

1918-1920 年「流行性感冒」に関する日本人専門家の構想の分析 ―経験の空間、経路依存および世代の三つの視座から

流行性感冒ないし「スペイン風邪」は 1918-1920 年にわたるインフルエンザ・パンデミックである。世界全体の死者数は 5000 万人を超えていたとも言われるが、このパンデミックは長い間忘れられていた。そして、新型コロナウイルス感染症（COVID-19）流行下において、かつてのパンデミックに対する関心が高まったものの、その理解は依然として浅いままである。

現在とかつてのパンデミックを比較・分析した少なくない歴史研究が登場したが、当時のパンデミック下における医師の役割や治療や予防に関する構想について取り扱った研究はほとんど存在しない。当時、日本における医学界では、流行性感冒の病因について白熱した議論があったが、従来の研究はこの点についてさほど言及していない。速水（2006）は新聞記事の分析をもとに日本での流行性感冒の伝播について詳細に明らかにしたが、当時の医学者間の議論には簡単に触れているだけである。そして Rice and Palmer（1993）は主に内務省衛生局編「流行性感冒」（1922）という公式記録に依拠して研究を行ったが、同時代における医学者の資料の分析を欠いている。したがって、流行性感冒に関する議論があったという事実はわかるが、様々な医学の専門家が流行性感冒の原因と治療について具体的にどのように考えたかは明らかになっていない。流行性感冒が予防医学分野に与えた影響を知るために、当時の医学者の議論が重要である。

本研究では当時の医学者の議論を分析して、いかなる理由で、どのような経験から、当時の伝染病の専門家は流行性感冒の病因をめぐる意見対立が生じたのかを検討する。はたしてこの論争は、よく言われるように、北里研究所と東京帝国大学との対抗の産物に過ぎないものであったのだろうか。本稿は以上のような問題に解答を与えるものである。そこで、以下では 1918-1920 年パンデミックに関する日本の医学的な経験を把握するため、医学者たちの過去の経験と流行性感冒について記した論文を検討したい。

具体的には、20 名の医学者と彼らが 1918 年から 1926 年の間に医学雑誌に寄稿した論文 20 報を取り上げる。本稿では Koselleck（1979）の「経験の空間」（Erfarungsraum）という理論と Fairclough（1998）・Beyen（2019）の談話分析という理論の二つを採用する。方法としては、まず 20 人の医学者の過去の経験、教育、世代などに触れて「経験の空間」を分析する。その後、これら医学者の記した流行性感冒に関する文章を対象として談話分析を行い、

著者の経験が流行性感冒についての意見にどのように影響したのかを検討する。このさい重視するのは、過去の経験が未来の期待を定めるという点である。

20 名の医学者の経験を考えると、欧州留学を果たし、医学研究を行ったのは 13 名である。彼らは 1918-1920 年パンデミック時は東京帝国大学、京都帝国大学、九州帝国大学、北里研究所、金沢医学専門学校、公立大阪医科大学、杏雲堂病院、関東都督府大連療病院などの様々な大学や施設に所属していたが、その大半は東大卒業生であった。また医学者たちの生まれ年から見ると、二つの世代があるということも分かる。それは 1889-1890 年のインフルエンザ・パンデミックを経験した世代と経験しなかった世代である。

また医学雑誌の論文 20 報の分析からは以下のことが指摘できる。6 報は Pfeiffer が 1892 年に発見したインフルエンザ菌が流行性感冒の原因であると判断するものである。また 1 報は原因が未知の病原体にあると考えるもの、5 報では病因は不明であるとしつつもインフルエンザ菌ではないかと判断している。最後の 8 報は病原体が不明だとしても、合併症を治療できると判断したものである。つまり、流行性感冒の病因に注目しない論文と言える。以上から、20 名の医学者たちは、流行性感冒の病原体を特定できておらず、同じ大学内でも異なる意見を持ち、時に所属が異なっても同じ見解を持つ場合もあったことを指摘できる。

ここから、従来の研究のように、北里研究所と東大医学部との対抗意識だけでは病因論に関する論争を説明できないことは明らかで、実際のところはより複雑な現実があったことが考えられる。そして医学者の論文分析から明らかになったことは、流行性感冒の原因が見つからずとも、かかる論争は医学分野と治療実験を発展させたという重要な事実である。そのうえ、流行性感冒に関する議論では初めて細菌学を疑問する医学者がいて、細菌学パラダイムの終わりの始まりが感じられる。流行性感冒の経験がその後の 1930 年代の医学研究にどのような影響を与えたのかという分析については今後の課題となる。

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1. Introduction

As it is not unusual during a period of crisis to reach back to past experiences, both public and scientific interest for the long forgotten "Spanish flu" of 1918-1920[1] has risen during the current COVID-19 pandemic.[2] The influenza pandemic of the early twentieth century was a mystery to the medical world at the time as it could not be fully explained by the bacteriological theory that was dominant and therefore it became both a subject of debate and a chance to experiment with remedies, often in the form of vaccines. Although a lot has been written about the influenza pandemic, the debate within the medical world has not yet received the attention it deserves. This medical debate onwhat was causing the pandemic is interesting because it shows how a paradigm can start to shift, as experts drawing on their experiences try to cope with a realty in which the dominant paradigm does not have all the answers. While most research focusses on Western cases or colonies, this thesis will focus on the case of Japan to show that the debate about the influenza pandemic was a global debate. Japan was a full-fledged empire at the time of the pandemic and its medical science had caught up with the world level. With a close study of the discussion amongst Japanese experts in the 1920s on the possible causes of and the appropriate measures against the influenza pandemic, this thesis will show the first cracks in the bacteriological paradigm, years before the shift to the virological paradigm in 1933.

An analysis will be made of academic articles about the epidemic influenza of 1918-1920 which were published in Japanese medical journals by contemporary experts of infectious diseases, in order to get a better understanding of how the "spaces of experience" of the experts were connected to the discourse in their texts, in order to explain the different conceptions of the origin of the influenza pandemic at the time. As primary material for this analysis, 24 articles were gathered from various Japanese medical journals such as: *Kitasato Archives of Experimental Medicine*, *Chūgai iji shinpō* 中外醫事新報 (Domestic and foreign medical practice news)[3], *Nihon naika gakkai zasshi* 日本内科学会雑誌 (Japan internal medicine association journal), *Nihon shōka kibyō gakkai zasshi* 日本消化機病学会雑誌 (Japan digestion diseases academic society journal), *Jikken igaku zasshi* 実験医学雑誌 (Experimental medicine journal), *Dai Nihon jibiinkōka kai kaihō* 大日本耳鼻咽喉科會會報 (Greater Japan

[1] While the "Spanish flu" is often referred to as the 1918 pandemic, this paper prefers "the 1918-1920 pandemic" because in Japan the mortality rates were spread more evenly over the three years, in contrast with the UK and USA, where mortality was concentrated mostly in 1918, Richard et al. 2009, p. 1066.
[2] Staub and Floris 2021, p. 318; Phillips 2004, p.122; Robinson 2020; Sharma et al. 2021; Fujihara 2021.
[3]The English translations of Japanese publication names or titles used in this thesis are my own translations unless it is indicated otherwise.

otorhinolaryngology association bulletin), *Saikingaku zasshi* 細菌學雜誌 (Bacteriology journal), *Kanazawa igaku senmon gakkō 10 zenkai zasshi* 金澤醫學專門學校十全會雜誌 (Kanazawa medical college 10th whole assembly journal), and *Juntendō igaku* 順天堂医学 (Juntendō medical magazine). Other important sources are the official report about the epidemic influenza titled *Ryūkōsei kanbō* 流行性感冒 (Epidemic influenza), which was published by the Naimushō Eisei-kyoku 内務省衛生局 (Sanitary Bureau of the Home Ministry)[4] and the book of the Japanese historian of demography Hayami Akira 速水 融 (1929-2019) entitled *The Influenza Pandemic in Japan, 1918-1920: The First World War between Humankind and a Virus*, which was translated into English in 2015.[5] This thesis is –to my knowledge– the first work studying the discourse in Japanese medical journals with regards to the 1918-1920 epidemic influenza. However, there has been a lot of research on the subject, partly due to the centennial of 2018. The focus of recent historical research on the "Spanish flu" lies often on recalculating the excess mortality caused by the disease, or on the public measures that were taken against the disease.[6] Recent research in Japan, for example, focused on the medical records of hospitalized soldiers during1919-1920 to understand the impact of the "Spanish flu".[7]

This thesis makes use of a framework that allows for gaining a deeper understanding of both (1) the background of the authors of the articles, and (2) the language usage in the articles itself. To analyze the background of the authors, their past experiences, and how these influenced their expectations for the future, the thesis draws on the concepts of "space of experience" and "horizon of expectation" as formulated by the historian Reinhart Koselleck (1923-2006).[8] Additionally, as past experience comprises more than only personal experiences, the concept of "communicative memory"[9] of Egyptologist and memory theorist Jan Assmann, and the concept of "generation" of historian Jürgen Reulecke will be utilized.[10] In order to get a grasp on the impact of the academic institutions on the experiences of scholars, the thesis draws on theories about historical institutionalism and path dependency as formulated by political scientist Paul Pierson.[11] Additionally, the ideas of philosopher

[4] Naimushō Eisei-Kyoku 1922
[5] Hayami 2006.
[6] Alexander 2019; Chandra 2013; Crosby 2003; Ikeda et al. 2005; Johnson and Mueller 2002; Nishimura and Ōkusa 2016; Ōmi 2009; Rice and Palmer 1992a/1992b/1993; Richard et al. 2009.
[7] Kudō et al. 2017, p. 662.
[8] Koselleck 1979; This concept has only rarely been used as an analytical framework for the history of Japan, one earlier work is that of Schmidt 2014.
[9] Assmann 2008; This idea of cultural and communicative memory was a collaboration of Jan Assmann and his wife Aleida Assmann.
[10] Reulecke 2008.
[11] Pierson 2004.

of science Thomas Kuhn about paradigms will be utilized to understand the paradigm and possible shift of which the authors were part.[12] After considering the "space of experience" of the authors, the academic articles they wrote will be the subject of a discourse analysis following the approach of Marnix Beyen, who drew on the theory of Norman Fairclough and adapted it slightly for historical application.[13] This analysis will bring to light the main discourses in the medical field regarding the influenza pandemic and show that the "Spanish flu" meant the beginning of the end of a paradigm in preventive medicines.

This thesis is limited in time to the years from 1918 until 1926, which are the years of the pandemic and a few years of its aftermath in which some articles about the epidemic influenza were still published. However, in order to understand the past experiences of the experts, a historical overview of the years leading up to the pandemic will also be included. Geographically, the focus will be on the Japanese empire, including mainland Japan and its colonies at the time, but not going broader, as the scope of a master thesis will not allow for a transnational or international comparison. Moreover, due to the academic articles as primary sources, the focus will not be on the experiences of the whole of the Japanese population, but on one specific social group: highly educated experts. This group is interesting to study as many of them later became actors on a local level, in universities, hospitals and army, and on international level, for example as member of the League of Nations Health Organization. Lastly, it should be said that this thesis will not cover the medical details of this disease. Although shortly touching upon the epidemiological aspect of the disease, the main focus of the paper will be on the historical aspect of the 1918-1920 pandemic.

[12], Kuhn 1970.
[13]Beyen 2019; Fairclough 1998; Fairclough 2013.

2. The Influenza Pandemic of 1918-1920 in General

Before looking into how the influenza epidemic was experienced in Japan, the pandemic will be explained from a global perspective, discussing the impact it had on the world. Additionally, in order to get a better understanding of how the epidemic spread, the medical knowledge we have today about the virus that caused the pandemic will be briefly introduced.

2.1. The Global Experience of the Influenza Pandemic

The influenza pandemic that raged through the world in 1918-1920, infected an estimated 25-30% of the world population and caused worldwide between 20 and 50 million deaths.[14] This variation in possible numbers of deaths is the result of a lack of sufficient cause specific mortality statistics in many places, either because the influenza struck so quickly that the system was overwhelmed, or because influenza was not a notifiable disease and was often misdiagnosed.[15] Therefore, the estimation of 21.5 million deaths that was made in the 1920s has been revised in recent years to a mortality figure closer to 50 million, which might still be an underestimation. [16] This means that the influenza pandemic in 25 weeks killed more people than AIDS did in 25 years, and that several times more people died as a consequence of epidemic influenza than in World War I.[17] As a comparison, the total of people who passed away as a consequence of the current pandemic of COVID-19, is according to the WHO currently at circa 4.3 million people.[18]

Although the epidemic influenza of 1918-1920 has often been referred to as the "Spanish flu", this does not refer to the place of origin of the disease. The influenza pandemic received this name because when the Spanish king in April of 1918 had a severe case of the epidemic influenza, this news travelled the world, as Spain was neutral in World War I and did not have a wartime censorship to keep its health problems secret from its neighboring countries.[19] However, this name was quite misleading and some Japanese authors studying the disease in 1919, for example, assumed that the disease originated in Spain as the disease was also called *Supein kaze* スペイン風邪 (Spanish flu) in Japan. The other often used term for the disease in

[14] Taubenberger 2006, p. 86.
[15] Shors 2017, p. 422; Crosby 2003, pp. 19, 27; Phillips 1990, p. 157.
[16] Trillia et al. 2008, p. 668; Richard et al. 2009, p. 1062; Crosby 2003, p. 207; De Melker 2005, p. 684; Johnson and Mueller 2002, p. 105; Saunders-Hastings and Krewski 2016, p. 66.
[17] Shors 2017, p. 422.
[18] World Health Organization, https://covid19.who.int/ , last accessed August 12, 2021.
[19] Trillia et al. 2008, p. 668; Crosby 2003, p. 26 ; Rice and Palmer 1993, p. 390.

Japan was the more neutral *ryūkōsei kanbō* 流行性感冒 (epidemic influenza).[20] During the first wave of the pandemic, newspapers did not pay much attention to the few reported cases of influenza, because it did not seem to be a serious disease and also because the focus still was on the ongoing war. At this time, the disease was in many countries known as the "three-day fever" or in France as the *petite épidémie* (little epidemic).[21]

The different names that were given to the pandemic by doctors, experts and the media depending on the region, are interesting to look into from an onomasiological point of view. Often the names referred to the foreign origin of the disease, or carried blame for another group of people, which functioned as a rhetorical strategy. Namely, the association between a new infectious disease and foreigners can be a way to promote fear for the tropical disease, while at the same time providing a sense of safety to the public.[22] For example, in Spain the pandemic was not known as the "Spanish flu", but as the "French flu". This can be explained by the rivalry between France and Spain, in combination with the suggestion that it were Spanish and Portuguese migrant workers who had been employed in France to replace the French workers engaged in the war effort, who brought the influenza epidemic with them on the busy railroad traffic.[23] Other examples are the referring to the disease as the "Bolshevik disease" in Poland, as the "white man's sickness" in South Africa, or as the "Flandern-Fieber" (Flanders Fever) by German troops stationed in Flanders during World War I.[24]

While the epidemic influenza raged throughout the whole world, the experience of the disease differed depending on regions or countries. Due to the different ways of counting victims of the epidemic and due to incomplete historical statistics, it is hard to compare numbers of deaths of different countries and those numbers in recent research continue to be revised.[25] The generally accepted point of view is that European and North American death rates were low compared to those of Africa, Asia, and Latin America. In Europe, for example, the mortality in the Netherlands was estimated to be 0.44%[26], that of Sweden 0.59%[27], and that of Spain 1.5% of the overall population.[28] Also the U.K. (0.59%) and the U.S. (0.28%) suffered comparably few

[20] Onodera 1919, p. 634; Rice and Palmer 1993, p. 390.
[21] Bouron 2009, p. 86 ; Tognotti 2003, p. 99.
[22] Beyen 2019, p. 77 ; Hoppe 2018, pp. 1462-63.
[23] Trilla et al. 2008, p. 669.
[24] Beyen 2019, p. 77 ; Crosby 2003, p. 26.
[25] Johnson and Mueller 2002, pp. 105-06; Phillips 1990, p. 157; Crosby 2003, pp. 19, 27.
[26] Cornelis 2018, p. 1; According to the updated account of Johnson and Mueller, this number should be closer to 0.71%, Johnson and Mueller 2002, p. 113.
[27] Rice and Palmer 1993, p. 412; Johnson and Mueller 2002, p. 113.
[28] Trillia et al. 2008, pp. 672 ; Johnson and Mueller 2002, p. 113.

losses. A possible explanation is that the first mild wave of epidemic influenza was widespread in these countries. As a result, fractions of the population developed a certain degree of immunity early on and were partly protected against later more severe waves of the pandemic.[29]

In Asia, India was hit worst with an estimate of close to 20 million deaths, which accounts for a mortality rate between 4.6% and 6.7% of the population. Possible factors explaining this high mortality are the lack of access to medical treatment in lower classes and malnutrition due to famine.[30] Also in Korea the rate was higher than in Europe, as the lowest possible death rate according to reports by the Japanese colonial government was 2.38%.[31] Although exact mortality figures for China are lacking, it is known that epidemic influenza was widespread there, but relatively mild in comparison to other countries.[32] In Japan there were slightly fewer victims than in other Asian countries with an estimated death rate of 0.87%.[33] As an example of a country in Latin America, in Mexico, an estimated 500,000 people died as a result of the influenza pandemic, which accounts for 2 to 4% of the population.[34] Lastly, in South Africa new estimates were made of the number of people who perished due to epidemic influenza, resulting in a mortality figure of 250.000 to 350.000 deaths, which accounts for 3.40% to 5.17% of the population, with most of the casualties among people of color.[35]

The influenza pandemic is generally accepted to have started in the northern spring and summer of 1918, persisting in some regions until 1920.[36] The first reported cases of the novel influenza virus showed up in early 1918 in army camps in North America, such as Camp Funston in Kansas. Soon after, the American soldiers who traveled to Europe to fight in the First World War took the disease with them. The virus thrived in the crowded military camps in the U.S. and in the trenches of the Western Front of Europe, causing first a mild wave which spread through Europe in May 1918, followed by the severe second wave which spread in France in the aftermath of the war at the end of 1918.[37] As a consequence of the unprecedented concentration of soldiers of

[29] Richard et al. 2009, p. 1068.
[30] The range in percentages of mortality is most likely due to the uncertainty about exact total population numbers in India at the time; Rice and Palmer 1993, p. 412; Alexander 2019, p. 446, Mills 1986, pp. 34-35.
[31] Chung and Yang 2007, p. 191.
[32]Langford 2005, pp. 490-91.
[33] Richard et al. 2009, p. 1067.
[34] Alexander 2019, p. 446.
[35] Phillips 1990, pp. 160, 176; Calculated for a population of 6,769,000. Johnson and Mueller 2002, p. 110.
[36] Johnson and Mueller 2002, p. 107.
[37] Rice and Palmer 1993, p. 390; Shors 2017, pp. 423-24; Byerly 2010, p. 82; Crosby 2003, p. 25.

various nationalities who traveled throughout Europe during the last year of the First World War and who very often had endured considerable physical and psychological hardships for years, likely weaking their immune system, the "Spanish flu" spread extremely quickly from France to other countries in Europe.[38] Most countries experienced three successive waves, of which the first was often a milder wave, similar to the common flu, and the second and third wave were the more severe and lethal waves. Because the first wave seemed to be not a great threat, often state measures were only taken from the second wave onwards.[39]

Looking at patients who contracted epidemic influenza, two main characteristics stand out: the mortality due to secondary complications, and the high mortality among young adults. Most of the epidemic influenza patients had a few days of fever but recovered in a short space of time. Others, however, had a relapse after their symptoms seemed to have faded. A new rise in temperature gave way for troublesome complications, especially in the respiratory tract, which could result in fatal bacterial pneumonia or bronchitis.[40] Consequently, the majority of mortality during the pandemic was not caused directly by influenza, but by secondary bacterial pneumonia and respiratory failure caused by *streptococcus pneumoniae, streptococcus pyogenes, H. influenzae, Staphylococcus aureus* and other organisms.[41] The second characteristic is that mostly young people in the prime of their life subdued to the disease. While usually influenza can be fatal mostly among infants and elderly, during the 1918-1920 pandemic atypically the mortality impact was concentrated in young adults between 20 and 40 years old. Until today, the reason for this is not fully understood.[42]

Measures taken against the epidemic influenza were all over the world quite similar, as a remedy was not available and the state could only utilize non-pharmaceutical interventions against the disease.[43] Informing people about the epidemic through newspapers was an important tool. However, at the start of the pandemic, public health officials tried to reassure the people, by reporting that the disease was just a common flu, or just a disease on another continent.[44] As soon as it became clear that the disease had to be taken seriously and that experts could not determine the causative agent, measures to limit the impact of the disease were taken:

[38] Tognotti 2003, p. 98.
[39] Bouron 2009, p. 83; Tognotti 2003, p. 98; Alexander 2019, pp. 446, 462; Tognotti 2003, pp. 98-99; Cornelis 2018, p. 3.
[40] Tognotti 2003, p. 100; Alexander 2019, p. 443. Another explanation is that a "cytokine storm" caused organs to fail with lethal consequences, but this will be explained further in the next chapter.
[41] Taubenberger et al. 2007, p. 584.
[42] Bouron 2009, p. 88; Richard et al. 2009, p. 1062; Morens et al. 2008, p. 962-64.
[43] Saunders-Hastings and Krewski 2016, p. 66.
[44] Rosner 2010, p. 44; Bouron 2009, p. 87.

quarantine, isolation, public announcements, warnings, anti-spitting campaigns, legal restrictions on commercial activities, inspections, surveillance, and mandated identification.[45] Additionally, often funerals and gatherings of more than 10 people were banned, and also door-to-door sales were prohibited. Many cities closed public buildings such as theaters, libraries, churches and schools.[46] In Mexico, for example, sanitary brigades were formed to function as agents of local public health officials and regulations regarding public gatherings and public transport were put into place.[47] In Chicago, churches altered their practices: longer ceremonies were suspended, masses were shortened, and the churches were ventilated and cleaned in between masses. Movie theaters and vaudeville halls were closed down or had to adjust their schedules, and working hours were rescheduled to prevent crowding during the rush hours.[48] In the whole of the U.S., posters and leaflets were spread by the Red Cross, Federal Railroad Administration, and the Post Office Department, in order to prevent misinformation about the pandemic.[49] Facemasks were commendatory in some places, but their effectivity was doubted and many people resisted using them.[50] In the Netherlands, public health measures were limited to the closing of schools for 6 to 8 weeks and to asking medical students to temporarily halt their studies and help out local doctors.[51]The shortage of doctors and nurses was a recurring problem worldwide at the time of the pandemic. In the U.S., the Red Cross attempted to solve the shortage problem by encouraging even inexperienced people to volunteer as nurse.[52]

As medical specialists could not discover the origin of epidemic influenza, scientific uncertainty about the cause of the fierce disease caused anxiety and depression. In Italy, especially among the lower classes, attitudes of passivity and resignation spread, resulting in refusal to follow the rules on hygiene promoted by authorities. Further, popular home remedies reappeared and advertisements for preparations were abundant in the newspapers.[53] Some doctors prescribed alcohol as a way to prevent infection, which led to an increase in alcohol consumption, and also smoking was rumored to help kill the pathogen.[54] Apart from leading to various questionable remedies, the mystery of the cause of the pandemic also led people to

[45] Rosner 2010, p. 39.
[46] Shors 2017, p. 424.
[47] Alexander 2019, p. 450.
[48] Rosner 2010, p. 39.
[49] Crosby 2003, p. 49.
[50] Saunders-Hastings and Krewski 2016, p. 66.
[51] Cornelis 2018, pp. 3-4.
[52] Crosby 2003, p. 51.
[53] Tognotti 2003, p. 106.
[54] Tognotti 2003, p. 107; Saunders-Hastings and Krewski 2016, p. 66.

theorize about a connection to the ongoing First World War. In Italy, some people thought it could be a "bacteriological war" instigated by Germany, as this was the place where the micro-organism which was thought to cause the disease, was first identified. Consequently, an Italian doctor sent a leaflet to the Ministry of Health with the allegation that the disease might be "of criminal origin".[55] Also in the U.S. these kinds of theories existed. People speculated that Germans put influenza-causing organisms into Bayer aspirin tablets to use as germ warfare. In the middle of the severe fall epidemic, the U.S. Public Health Service Hygienic Laboratory examined 200 tablets of aspirins, but no evidence was found, and the conspiracy theories stopped when also Germans started to fall ill.[56] Other theorists blamed the disease on the war and on the usage of chemical weapons, the poor diet, poverty, and lack in sanitation it caused. This however could not explain that countries such as Sweden and Switzerland, which had been neutral in the war, or New Zealand, the U.S. and Japan, which bloomed with economic prosperity during and in the immediate after math of the war, had the same casualties from the disease as France and Germany, which were at the center of combat.[57]

As said before, the emergence of various theories about the origin of epidemic influenza and ways to treat it, was a result of the uncertainty about the true cause of the disease in the medical field. The 1918-1920 pandemic came at a time of medical optimism that had started after the biomedical field entered the microbiological era in 1876.[58] In the two decades after the theory of germs as causes of disease of the French microbiologist Louis Pasteur (1822-1895) was generally accepted, a steep decline in mortality rates took place throughout the world as a result of enforced hygiene measures. One after the other, pathogenic agents of diseases that had until then been hard to understand, such as anthrax, cholera, tuberculosis, plague, and syphilis, were identified. The trust in medicine reached new heights and with epidemics such as cholera seemingly belonging to the past, the idea arose that the world could one day be free of infectious diseases. This illusion was shattered by the influenza of 1918-1920, which showed that bacteriology did not have the answer to everything.[59]

The last influenza pandemic before the one of 1918-1920, was the one of 1889-1890, which was the first epidemic influenza to be studied using methods of modern pathology and bacteriology. One of the complicating factors in the study of influenza

[55] Tognotti 2003, p. 101.
[56] Shors 2017, p. 424; Crosby 2003, p. 216.
[57] Crosby 2003, pp. 216-17.
[58] Crosby 2003, p. xiv.
[59] Tognotti 2003, pp. 97, 109; Taubenberger et al. 2007, p. 581.

was that pandemics only occurred sporadically and unpredictably, and the pandemic of 1889-1890 was the first influenza epidemic since the one of 1847-1855. With new clinical material available, this pandemic became an exciting case for experts to apply their new knowledge on.[60] It was the German bacteriologist Richard Pfeiffer (1858-1945) who under guidance of the most prominent scholar in the field at the time, Robert Koch (1843-1910), declared to have discovered the pathogen of influenza in 1892. The germ that today is known as *Haemophilus influenzae,* was at the time called *bacillus influenzae* or Pfeiffer's bacillus, after its discoverer. Because the influenza germ was only identified after the pandemic of 1889-1890 had subdued, it could not be verified and as some physicians found the germ when investigating patients with other diseases or healthy patients, the pathogen of epidemic influenza remained under discussion until the next influenza pandemic of 1918.[61] During the pandemic of 1918-1920, experts continued to have trouble to find the Pfeiffer's bacillus in influenza patients, and the option of "filter-passing" agents which would be smaller than bacteria, was explored to disprove Pfeiffer's discovery. Additionally, as the research advanced, physicians started to think that the Pfeiffer bacillus was only a secondary complication and not the cause of the disease. In this way, the influenza pandemic of 1918-1920 was a catalyst for a large alteration in biomedical knowledge of diseases, and for the development of various experimental vaccines which led to contradictory claims of successes.[62]

Usually vaccines are developed only after a disease is discovered, as a measure against the disease. However, influenza is an exception, as during the "Spanish flu" the germs discovered in patients that were thought to possibly cause the disease were used for experimental vaccines, while experts were still looking for the real origin of the disease.[63] That the Pfeiffer's bacillus was seen as the probable cause of influenza is reflected in the use of vaccines, which during the pandemic of 1918-1920 in several countries, among which are the U.S. and Japan, were developed by authorities, based on the Pfeiffer's bacillus. In 1919, the evidence against Pfeiffer's bacillus ran more strongly as the germ had been found in healthy patients and could not be found in many influenza patients. Instead, medical scholars started to focus on the serious symptoms which were thought to be caused by secondary complications caused by streptococci, pneumococci, and *Bacillus influenzae*. As the perception of Pfeiffer's bacillus as the cause of influenza altered, also the vaccination strategy changed. Later vaccines were

[60] Eyler 2010, p. 28; Taubenberger et al. 2007, p. 582.
[61] Fukumi 1985, p. 108; Eyler 2010, p. 29.
[62] Taubenberger et al. 2007, p. 583; Eyler 2010, pp. 27, 30.
[63] Fukumi 1985, p. 107.

composed of other organisms, such as pneumococci and streptococci bacteria, sometimes in mixtures and were composed in this way to prevent the pneumonia that accompanied influenza. Confusion and contradictions arose in the medical field because all vaccines were reported to be equally effective against the epidemic influenza. Both the vaccines only using the Pfeiffer's bacillus and the vaccines composed of a mixture of organisms, regardless of their composition and mode of administration seemed to achieve the same successful results, while in reality they were at best having effect only on secondary bacterial infections. The problem was that standards for vaccine trial were not yet established, which made it hard to ascertain whether a vaccine worked properly. The 1918-1920 pandemic was a time in which the first standards for vaccine development were starting to be put in place.[64] Additionally, the pandemic was the start of the shift of bacteria theory to virus theory, although it would last until 1933 until the first virus was obtained from an influenza patient and successfully identified in the National Institute for Medical Research situated in Mill Hill, London.[65]

At the end of the 1918-1920 pandemic, still different theories were going around without one prevailing over the others. While some concluded that while Pfeiffer's bacillus certainly accompanied the influenza, it could not be confirmed as the disease's agent, those who defended Pfeiffer maintained the position that the germ was not found because of faulty methods and the insufficient understanding of the germ by other researchers. After years of successes, bacteriologists had to admit that they did not knew the solution.[66] The experience of the epidemic influenza of 1918-1920 might in the first place have deconstructed the existing medical knowledge and the trust in the new public health systems, on the other hand it also showed that methods of the previous era such as isolation, were still relevant and that there was an urgence to continue to improve public health planning, medical sciences, and international cooperation, leading to a better prepared world when the next global influenza epidemic occurred 40 years later.[67]

2.2. Epidemiological background: influenza type A virus H1N1

The study of a past pandemic is situated at the intersection of medical and historical research fields. Although this thesis takes an historical approach, in order to understand the experiences and challenges medical scholars faced in the 1920s, a medical

[64] Eyler 2010, pp. 30-33.
[65] Fukumi 1985, p. 112
[66] Tognotti 2003, p. 105.
[67] Eyler 2010, p. 35; Rosner 2010, p. 46; Saunders-Hastings and Krewski 2016, p. 66.

background of influenza and specifically the influenza epidemic of 1918-1920 is required.

Influenza had been a recurring disease before it became a pandemic in 1918. Accounts of outbreaks of highly contagious respiratory illnesses followed by pneumonia date back as far as at least 400 BC. Its name stems from the Latin *influentia* meaning 'to flow into', which refers to the old belief that the disease was caused by an intangible fluid given off by stars, influencing humans.[68] In the past, influenza pandemics have occurred when the influenza type A virus mutated at a high rate, causing both high morbidity and high mortality. Four such major influenza pandemics occurred in the years 1781-82, 1789-1799, 1830-33, and 1847-1855. The following influenza pandemic of 1889-1890, was the first one since biomedical research had entered the microbiological era and it provided the clinical material bacteriologists had been waiting for. As already stated above, based on the findings during and after the 1889-1890 pandemic, scholars believed the Pfeiffer's bacillus (now called *Haemophilus Influenza*) to be the cause of epidemic influenza until 1918. The pandemic of 1918-1920 is the first influenza pandemic for which extensive data is available. It also was the start of a paradigm shift away from the bacteriological era, as bacteriologists could not discover the origin of the disease, leaving the medical field in confusion. This pandemic was followed by similar ones in 1957, 1968, 1977 and 2009. In order to distinguish the scale of a pandemic, several indicators are considered: the absenteeism from schools and workplaces, an increase in hospital admissions, and deaths amongst elderly. The "Spanish influenza" however was peculiar because, as in addition to the usual risk group of elderly and small children, the largest group of victims was that of healthy adults between the age of 20 and 40.[69]

As is well known today, but also already to some extent during the 1918-1920 pandemic, influenza is spread from person to person via contact or droplets (through sneezing, coughing and talking)[70]. Additionally, influenza seems to be more prevalent in the winter, on the one hand because people gather more indoors and are more vulnerable due to the cold, and on the other hand because the spread of type A influenza virus transmits best at a low humidity of 20% and colder temperatures of around 5°C. What was not known at the time of the "Spanish influenza", because viruses were not discovered yet at the time, is the way in which influenza spreads in the human body. After the influenza virus enters the respiratory tract, it can attach to

[68] Etymologia: Influenza 2006, p. 179
[69] Shors 2017, p. 396; Taubenberger et al. 2007, p. 582; Tognotti 2003, p. 105.
[70]The aerosol transmission through very small droplets in the air as observed in case of COVID-19 is a less important factor in the transmission of influenza, Tellier et al. 2019, p. 101.

and penetrate the ciliated columnar epithelial host cells lining the sinuses and airways. When the virus attaches to the host cells, the replication begins. This replication process destroys the host cell and allows the progeny influenza viruses to spread to nearby cells. As a result, the number of cilia, which clean the lungs, are reduced, leaving the person more vulnerable to complications such as sinusitis, otitis media, and pneumonia.[71]

The incorrect assumption that influenza was caused by a bacterium was only rectified in 1933, when human influenza A viruses were first identified. Currently, influenza viruses are classified under the Orthomyxoviridae family. Within this category, three types can be discerned: the influenza type A, influenza type B, and influenza type C viruses. All three can cause similar symptoms in humans. However, contracting one type does not provide immunity to the other types. While influenza type B viruses circulate only in humans, and type C only in humans and pigs, type A viruses have a broader host range and therefore are the most frequent to occur.[72]

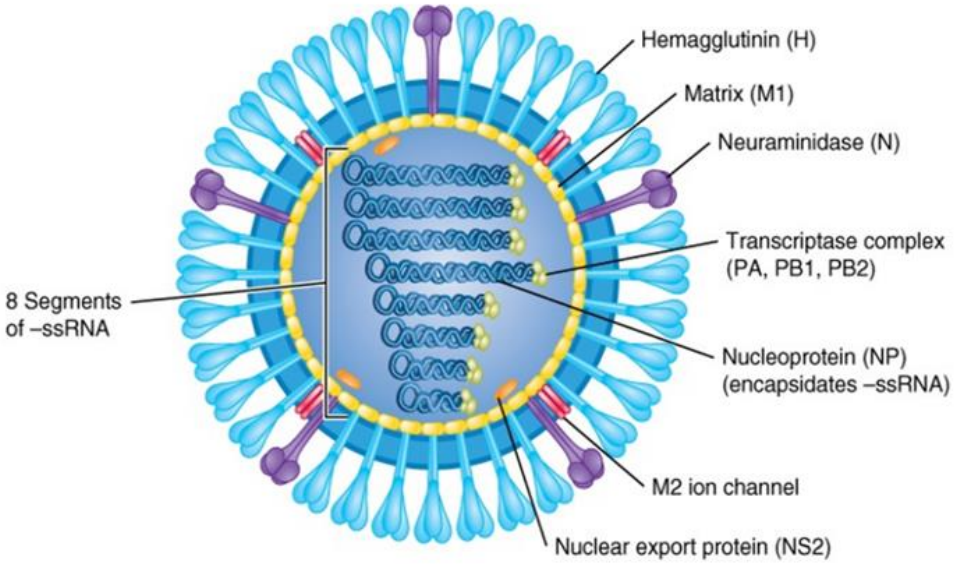


Figure 1 Schematic diagram of influenza A virus structure, Shors 2017, p. 407.

The influenza A virus has several subtypes, named after the hemagglutinin and neuraminidase glycoprotein spikes pointing outwards from its spherical surface as is illustrated in Figure 1. The different types of influenza A viruses are named after the types of Hemagglutinin and Neuraminidase present in the virus. 18 antigenically different types of Hemagglutinin (H1-H18 subtypes) and 11 distinct types of

[71] Shors 2017, pp. 401-02, 420.
[72] Shors 2017, pp. 399, 424.

Neuraminidase (N1-N11 subtypes) can be discerned. In humans, six subtypes of Hemagglutinin (H1, H2, H3, H5, H7, and H9) and two subtypes of N (N1 and N2) have been isolated. For example, the virus causing the 1918 pandemic was H1N1, the one causing the Asian Influenza in 1957 was H2N2, the one of the Hong Kong Influenza in 1968 was H3N2 and the Swine Influenza in 2009 was caused again by H1N1. The natural reservoir of all influenza A subtypes except for the subtypes H17, H18, N10 and N11, are wild waterfowl (ducks, geese and swans) and shire birds (gulls, terns and waders). Influenza subtypes H17N10 and H18N11 were identified in certain bats, suggesting that this species also might be an influenza reservoir. Besides these, H and N subtypes are also found in wild and domesticated animals such as horses, dogs, cats, swine, seals, whales, camels, etc.[73]

The composition of the influenza A virus is of importance in order to understand how viruses can become pandemic in a short period of time. Influenza A viruses are RNA viruses, and therefore their polymerases lack the "proofreading ability" which is an error-correcting process that occurs in human or viral DNA during the replication process. As a result, the viruses do not always replicate perfectly and mutations are common. The H and N genes of an influenza type A virus contain the code for the surface glycoproteins, which are the parts of a virus that are recognized by virus-neutralizing antibodies who defend the host cells from a viral attack. When changes take place in the antigenic structure of the H and N glycoproteins, the virus might change in such a way that few people have immunity against it and as a result, an epidemic or pandemic can occur.[74]

The genetic variation which gives rise to new strains of the influenza type A virus, happens in two processes: antigenic drift and antigenic shift. Antigenic drift is the result of changes in the H and or N gene. Going through different human host populations, a virus can mutate, leading to the production of new virus strains which might not be recognized by the body's immune system. This is why one can contract influenza more than once, and it is the cause of localized or seasonal influenza epidemics caused by the influenza type A or B virus. Every year, the vaccines against influenza therefore need updates to be in line with changes in the circulating influenza viruses. The other genetic variation process is the one that causes pandemics, called antigenic shift. An antigenic shift occurs when a type A influenza virus of nonhuman origin together with a type A influenza virus of human origin infect the same epithelial cell, resulting in a novel influenza A virus. This novel virus may contain such major

[73] Shors 2017, pp. 399; 406-07.
[74] Ibid., pp. 415-16.

changes in the N and H genes, that large groups of people do not have antibodies against it. This lack of immunity causes lots of people to be infected and leads to an influenza pandemic. Without vaccines, antigenic shifts result in unusually high numbers of cases and deaths for approximately 2 to 3 years.[75]

Although the origin and the reason why the pandemic of 1918-1920 was so lethal amongst healthy adults still remains largely unknown, researchers agree that its cause was an influenza A virus H1N1 subtype. It is believed that it might have been an avianlike influenza virus that in the decades before did not circulate widely among swine or humans which caused an antigenic shift, starting the pandemic. The subsequent waves that followed in 1918, 1919 and in some countries in 1920, are thought to be antigenic drifts of the same virus, although human samples from all three waves would be necessary to confirm this hypothesis. These findings have been first established in 1997 by virologist Jeffrey Taubenberger and his team. They were able to reconstruct the RNA from an in paraffin-embedded lung tissue sample of one of the victims of the second wave of the 1918 pandemic which was excavated from a mass grave in Alaska, by the pathologist Johan Hultin. In 2007 a team led by Kawaoka Yoshihiro 河岡義裕 at the university of Wisconsin-Madison, infected macaques with the reconstructed 1918 influenza type A virus in order to research the cause of death. The macaques died of a respiratory distress indicative of a cytokine storm,[76] which is therefore believed to be a viable explanation for the high death rates among youth during the 1918 pandemic as those with the most robust immune system are at the highest risk. However, scholars at the time of the pandemic believed that the main cause of death during the 1918-1920 influenza pandemic was secondary bacterial pneumonia, and some scholars today still think this might have been the case.[77]

[75] Shors 2017, p. 417; Rice and Palmer 1993, p. 392.

[76] A cytokine storm is a reaction of the immune system against a virus. Cytokines are hormone-like proteins that send signals to cells of the immune system and in this way coordinate their functions. A cytokine storm happens when there is an overproduction of cytokines, which without prompt medical care, can affect the lungs and block off air ways, resulting in acute respiratory distress and multiorgan failure, leading to death. Shors 2017, pp. 404-06; Fedson 2009, p. 1408.

[77] Shors 2017, pp. 425, 429; Saunders-Hastings and Krewski 2016, p. 66; Taubenberger et al. 1997, p. 1793; Reid et al. 1999, p. 1651; Taubenberger and Morens 2006, pp. 16-18; Morens et al. 2008, p. 962-64.

3. The 1918-1920 Influenza Pandemic in Japan

This chapter will describe the spread and the casualties of the epidemic influenza in Japan. First, this event will be put into the broader historical context of Japan in the late 1910s and early 1920s. Then a reconstruction will be made of how the epidemic influenza spread through Japan and how many victims were counted. Lastly, the measures taken by the state against the spread of the disease will be considered.

3.1. The Broader Historical Context of the Years of the Pandemic

The influenza pandemic took place in the middle of the Taishō period (1912-1926), which is a period known for its political and social turbulence as well as for its democratization tendencies. This section will provide a broader overview of different aspects of society during the Taishō period, ranging from political, economic, social, international, cultural, and medical developments.

By 1918 the health of the Taishō emperor had begun to decline and by 1919 he could no longer perform his duties. Consequently, in 1921 his son, prince Hirohito, took over his public tasks. In the Russian Revolution of 1917, the Czarist monarchy came to an end and after the October Revolution a civil war evolved that resulted in the establishment of the Soviet Union. It was in this period of turbulence that in September 1918 in Japan the first stable party cabinet with Hara Kei 原敬 (1856-1921) as "Commoner" Prime Minister was formed in the aftermath of the nation-wide "Rice-Riots" that were caused by a steep rise in food prices. Although the oligarchs of the previous Meiji period (1868-1912) still had considerable influence in politics, and Hara was assassinated in 1921, this period is seen as one of strong democratization tendencies in Japan, and therefore is remembered as the "Taishō democracy".[78]

Economically, the First World War, which Japan had entered on the side of the Entente Powers already on August 21, 1914, provided unexpected opportunities. The war boosted the already industrializing economy and exports. However, while wages rose during the war, prices rose faster, leading to an abrupt end to the wartime boom in April 1920 when the stock market plunged, which was followed by a decade of economic troubles.[79] In the countryside, the proportion of landlords, owner-cultivators, and tenants remained largely the same from the beginning of the 19th century until the 1930s. However, the productivity of farmers began to stagnate after a period of development and there was a growing discontent amongst middle and lower class farmers which resulted in social and political tensions and protests. At the peak

[78] Gordon 2014, pp. 161-63; Hane and Perez 2008, p. 201. Hall et al. 2008, p. 85.
[79] Gordon 2014, pp. 139-40; Nakamura and Odaka 2003, pp. 1-15.

of the wartime inflation, the price of rice had doubled compared to the previous year and between July and September 1918, violent "Rice Riots" broke out nationwide.[80]

In this period of accelerated industrialization, the increasing number of labor forces in factories demanded better conditions and the protection of their rights. Socialist movements held demonstrations and strikes in order to improve the labor circumstances. In addition, large numbers of women and girls were employed as labor forces in factories, as typists, telephone operators and clerks. They organized themselves in Women's Associations and demanded equal political rights for women. Another social project was for example the system of "district commissioners" that was first installed in Osaka in 1918. In this system, community leaders provided low-cost counseling for poor families on subjects such as hygiene, job introductions, and savings. This system was further expanded throughout the country in the 1920s.[81]

During the years of the pandemic, Japan controlled a number of overseas territories: the colonies Taiwan, Korea and South Sakhalin, as well as the Kwantung leased territory in Manchuria. After the First World War, it could take control of the previous German leased territory on the Shandong peninsula and several Pacific islands as mandates of the League of Nations. Large numbers of Japanese resided in these colonies, with in China, for example, 133,930 Japanese residents in 1920, mostly concentrated in Manchuria. During this same period, large protests were staged in the colonies, such as the peaceful demonstrations for independence that started in Seoul on March 1, 1919 with several hundred thousand students and laborers participating, and later spread nationwide. The Japanese colonial administration used military and police against the independence movement resulting in the death of several hundred colonial subjects and the imprisonment of thousands. The demonstrations in Korea were followed in the same year by the so-called "May Fourth Movement" in China, which was an anti-imperialist movement that was mainly directed against the aggressive Japanese policy towards China.[82] Furthermore, seventy thousand Japanese soldiers were sent on a military expedition to Siberia as part of a 15-nation force to counter Bolshevist revolutionary forces from July 1918 until 1922, largely coinciding with the years of the epidemic.[83]

[80] Gordon 2014, pp. 144, 162; Hane and Perez 2008, p. 206.
[81] Gordon 2014, p. 171; Hane and Perez 2008, pp. 218-19, 223.
[82] Hayami 2006, p. 178; Gordon 2014, pp. 173, 177; Hane and Perez 2008, p. 208.
[83] Gordon 2014, p. 174; Hane and Perez 2008, p. 211.

During the Taishō period, the number of well-educated urban inhabitants steadily increased, and due to the widespread literacy[84], there was a mass reading audience that enjoyed a thriving popular culture in the form of novels, magazines, and newspapers. Newspapers competed for the attention of the readers and by the mid-1920s, nationwide distributed newspapers had circulation figures between 1 and 1.5 million. For the more affluent families, it was not uncommon to have subscriptions to multiple newspapers. From data available about the number of newspapers and magazines purchased in the village of Yanagawa, in Fukushima Prefecture, it becomes clear that also in rural areas in 1918, more than half of the households read newspapers and that magazines were the second most popular medium after newspapers. Magazines dealt with all kind of subjects, ranging from political, social, economic, educational, and literary matters, and some targeted specific audiences like women and children. Often novels were serialized in newspapers or magazines, in order to attract a broader audience. Other mass entertainment existed in the form of the gramophone, motion picture, and from 1925 onwards, the radio.[85]

Medical education during the Taishō period was conducted in *igaku senmon gakkō* 医学専門学校 (medical colleges) and the imperial universities that had been established from 1886 onwards in Tokyo, Kyushu, Kyoto, Sapporo and Sendai. While in 1902 only 90 people graduated from imperial universities, this number of graduates increased to 546 people in 1925. In the 1920s, the number of graduating physicians continued to rise. However, the largest number did not graduate from the imperial universities, but from the medical colleges.[86] In 1913 there were 43,028 physicians in total and 1,109 hospitals, not including the infectious disease hospitals. These numbers rose to 47,108 physicians and 2,211 hospitals by 1927. However, while the number of physicians was increasing, the number of villages and towns without a doctor rose as well during the 1920s and 1930s. This was a consequence of freshly graduated physicians choosing to go to larger cities because they preferred to work in hospitals, which were scarce in smaller towns.[87] In 1913 there were 1,572 *densen byōin* 伝染病院 (infection hospitals) and 7,599 *kakuri byōsha* 隔離病舎 (isolation wards). In total, this accounted for 26,557 sickbeds in infection hospitals and 71,738 sickbeds in isolation wards. This large number of isolation wards was a remnant of the 1870s Meiji policies on hygiene which focused mostly on isolating sick people from society. In

[84] However, the illiteracy rate was still high in laborer's classes, especially among women, because of long working hours and bad living circumstances. Yamamoto 1981, p. 221.
[85] Hane and Perez 2008, pp. 231, 236-37. Ariyama 2009, pp. 126, 137.
[86] Ikai 2010, pp. 76,86,104.
[87] Ibid., pp. 142-151.

1887, it became mandatory to have an isolation ward in each municipality. The number of sickbeds in infection hospitals and isolation wards remained roughly the same until 1930, while the number of general sickbeds sharply rose and exceeded that of the isolation wards. This means that when the epidemic influenza struck in 1918-1920, there were roughly 98,000 sickbeds especially intended for isolation in case of infectious diseases.[88] Compared to the population of 55,963,053 according to the national census of 1920, this would mean there were approximately 2 sickbeds per thousand inhabitants especially reserved for infectious diseases patients.[89]

3.2. The Pandemic in Japan, its Spread and Numbers

Although the 1923 Kantō daishinsai 関東大震災(Great Kantō Earthquake) with its estimated 105,000 victims is often remembered as the most disastrous event in interwar period Japan, the influenza epidemic which raged between 1918 and 1920 actually caused at least twice as many, maybe even four times as many deaths, depending on the calculations.[90] The influenza epidemic swept through the country in a few weeks from the western part to the eastern and northern parts. The explanation for this fast spread is according to historians and epidemiologists to be found in the highly developed railway network at the time, which transported people, healthy and sick, throughout the country.[91] As influenza was not a notifiable disease in 1918, hospitals and doctors did not have to report patients to the government authorities, which makes it difficult to ascertain when and where the spread exactly started. For the same reason, the official report by the Naimushō Eisei-kyoku 内務省衛生局 (Sanitary Bureau of the Home Ministry) only has detailed information from the last ten days of January 1919 onwards, which is only after the peak of the early epidemic. Therefore, the historian of demography Hayami Akira 速水融 argues that for information about the first wave, newspapers are the main source to be considered.[92]

The approach of Hayami however, differs from the approach of the historians George W. Rice and Edwina Palmer, who based their research on the report of the Sanitary Bureau of the Home Ministry which was published after the epidemic had subdued in 1922 under the title *Ryūkōsei Kanbō* 流行性感冒 (Epidemic influenza).[93] They argue this to be a reliable source, because it includes all pneumonic and

[88] Ikai 2010, pp. 241-43
[89] Number taken from the population census of 1920, e-Stat Portal Site of Official Statistics of Japan. Population Census, https://www.e-stat.go.jp/en/statistics/00200521 , last accessed April 16, 2021.
[90] Tsuchida 2018, p. 8.
[91] Hayami 2006, pp. 42-43, Rice and Palmer 1993, p. 399.
[92] Hayami 2006, p. 43.
[93] Rice and Palmer 1993, p. 393.

epidemic-related deaths in its final totals, which provides for more complete and accurate pandemic figures than there are available for some European countries.[94] Based on these arguments, this paper will reconstruct the spread of the epidemic influenza based on both newspapers and the report of the Sanitary Bureau. Especially for the early epidemic, where the official report is less detailed, the description of how the influenza spread will rely on the broad newspaper study regarding the 'Spanish flu' conducted by Hayami, complemented with some details of newspaper articles included in the compilation of newspaper articles on epidemic influenza.[95]

The epidemic influenza is often seen to have had three epidemics in Japan, of which the first one was just a 'herald wave', a first mild wave which did not cause a lot of casualties. This early wave spread throughout the spring and summer of 1918. In April and May 1918 there were reports in Tokyo about a strange *rikishi kaze* 力士風邪 ('sumō wrestler's flu')[96] or *mikka kaze* 三日風邪 ('three day fever') which was deemed rather contagious, but not threatful because people got better after a short period of fever and headache lasting about three days.[97] Apart from this, there were reported cases in the naval units with some pneumonic complications.[98] The historian Hayami Akira additionally mentions a series of articles in the *Fukuoka nichinichi shinbun* 福岡日日新聞 (Fukuoka daily newspaper) in July and August 1918 about an outbreak of "swine cholera". He argues that this might have been swine influenza instead of cholera, and therefore might be seen as an early sign of the epidemic influenza.[99]

The first real epidemic then, referred to as the early epidemic, raged in Japan from the Autumn of 1918 until the Spring of 1919 with a peak in November 1918, although depending on the region and depending on whether an area was urban or rural, the timing of the peak differed. The spread seemed to be almost simultaneous throughout the country, however, the epidemic seems to have begun in the western region and then spread to the eastern and northern parts.[100] Because the exact numbers of cases during the early epidemic are unknown, the impact of the disease on society as reported in newspapers is the clearest indication of where and when the disease raged and to

[94] Rice and Palmer 1992a, p. 318.
[95] Taishō nyūsu jiten henshū iinkai 1987a, pp. 352-59; Taishō nyūsu jiten henshū iinkai 1987b, pp. 719-20.
[96] This name refers to the large number of absent sumō wrestlers due to influenza during the Tōkyō Grand Sumō summer tournament in May 1918; Hayami 2006, pp. 15, 165-67.
[97] "Tōkyō de kimyō na kaze ryūkō"東京で奇妙な風邪流行, *Tōkyō nichinichi shinbun*, May 25, 1918. Taishō nyūsu jiten henshū iinkai 1987a, p.352.
[98] Rice and Palmer 1993, p. 393.
[99] Hayami 2006, p. 44.
[100] Ibid., pp. 40, 43, 112.

what extent. On October 27, 1918 it was reported that elementary schools in Fukuoka prefecture had begun to close down because of the spread of the disease there and in the nearby prefectures Ōita, Nagasaki, and Kagoshima. By the end of October, there was an increase in cases and because 40% of postal workers had fallen sick, there had to be temporarily hired students to deliver mail. Similarly in telephone centers, factories and mines there were shortages in personnel because people came down with influenza. As a result, some coal mines temporarily suspended their operations.[101] Likewise, in Tokyo there was hindrance regarding postal, telephone and train traffic services, due to the influenza.[102] Approximately a week after the first reports on cases of influenza, it became clear that the disease was not receding, on the contrary, that the mortality was rising. This increase in mortality was caused partly by the influenza-associated secondary complications such as bronchitis and pneumonia. This increase in both cases and mortality had several consequences, such as a shortage of ice in hospitals and households to cool patients to lower their fever, a remarkable drop in the delivery of coal, and a reduction in pages of newspapers due to the continued shortage of personnel.[103] In Osaka for example, the deaths of influenza were rising so sharply, that the crematoria had to find temporal work forces to do double shifts in order to keep up with the pace at which people were succumbing to the disease.[104] Furthermore, in Tokyo where deceased had to be transported to crematoria in neighboring regions, an article in the *Tōkyō nichinichi shinbun* 東京日日新聞 (Tokyo daily newspaper) had a headline stating that there were "mountains of corpses at railway stations waiting to be send to crematoria". [105] In the second half of November, the number of cases had decreased, and although there were still deaths, schools reopened, and the economy began functioning normally again. The *Kagoshima shinbun* 鹿児島新聞 (Kagoshima newspaper) published an article stating that the peak appeared to have passed, drawing on the experience of the previous influenza pandemic of 1889-1890. However in 1918, the influenza spread from the cities to the countryside, and there people continued to die from the disease although the peak had passed. In some regions, like the Kinki

[101] Hayami 2006, pp. 45-46.

[102] "Tetsudō/ denwa/ yūbin ni shishō" 鉄道・電話・郵便に支障, *Jiji shinpō*, 26 October, 1918. Taishō nyūsu jiten henshū iinkai 1987a, pp. 353-54.

[103] Hayami 2006, pp. 46-47.

[104] "Ōsaka no shisha fue, kasōba ga ma ni awazu" 大阪の使者増え、火葬場が間に合わず, *Ōsaka mainichi shinbun*, 6 November, 1918. Taishō nyūsu jiten henshū iinkai 1987a, p. 356.

[105] "Chihō kasōba he okuru tame teishaba ni shitai no yama" 地方火葬場へ送るため停車場に死体の山, *Tōkyō nichinichi shinbun*, 7 November, 1918. Taishō nyūsu jiten henshū iinkai 1987a, p. 357.

region, there was a resurgence of the disease in the first months of 1919, while in others like in Fukuoka, there were no confirmed influenza cases in early 1919.[106]

After the Spring of 1919, there was a period in which the epidemic seemed to have subdued. However, in December 1919, the epidemic influenza resurged and peaked in the period between late January and March 1920. Newspaper articles published during the peak of the late epidemic mentioned that in the regiment of Tottori prefecture more soldiers were infected than the year before, and that the numbers in the army rose to 25,000 patients and 900 deaths. The Sanitary Bureau asked people to wear facemasks when traveling by train, provided vaccinations, and planned to distribute warnings throughout the country.[107] In early February, the late epidemic began to subside in some areas, while it continued to circulate in other regions until June 1920.[108] A recurring observation about the late epidemic was that it did not spread as widely as the year before, but was more severe when one caught it, which led to a low morbidity rate, but high case fatality rate.[109] Additionally, in the official report by the Sanitary Bureau, the observation was included that people who had been sick with influenza during the first epidemic seemed to be less likely to contract the disease the next year.[110] A theory is that the virus underwent mutations when it circulated among humans and changed as a consequence of this antigenic drift. The mutated virus might have become more deadly, but as it still resembled the virus of the earlier epidemic, people who had experienced the flu the year before had some immunity against it. This might explain why fewer people fell ill, while sick people had a higher chance to die. However, due to a lack of detailed data, it is impossible to verify this hypothesis statistically.[111]

[106] Hayami 2006, pp. 47-49, 57.

[107] "Kaku chi de mōi furuu" 各地で猛威ふるう, *Jiji shinpō,* 10 January, 1920. "Guntai no kanja ruikei 25,000, shibō 900 nin" 軍隊の患者累計二万五千、死亡九百人, *Tōkyō asahi shinbun,* 22 January, 1920. "Masuku kakeneba densha no jōsha kyohi mo" マスクかけねば電車の乗車拒否も, *Ōsaka mainichi shinbun,* 14 January, 1920. Taishō nyūsu jiten henshū iinkai 1987b, pp.719-20.

[108] Hayami 2006, p. 105.

[109] Ibid., p. 85.

[110] Naimushō Eisei-kyoku 1922, p. 88.

[111] Hayami 2006, p. 105; Shors 2017, p. 417.

Table 1 Estimations of deaths and death rates in the first and second epidemic, and the total of the 1918-1920 influenza pandemic, based on secondary literature as indicated. Death rates in [brackets] were calculated for a population of 55,963,053 people

	Palmer and Rice 1993	**Eisei-kyoku 1922**	**Hayami 2006**	**Ōmi 2009**	**Richard et al. 2009**	**Chandra 2013**
First epidemic (1918.10-1919.5)	257,363	257,363	266,479	284,809	299,700	-
Second epidemic (1919.12-1920.5)	-	127,666	186,673	180,861	181,800	-
Total (1918.10-1920.5)	257,363	385,029	453,152	465,670	481,500	1,970,000 - 2,020,000
Total Death rate	0.45%	[0.69%]	[0.81%]	[0.83%]	0.87%	3.62%-3.71%

The numbers of the morbidity and mortality due to the influenza pandemic in Japan were published shortly after the pandemic by the Sanitary Bureau in their report titled Ryūkōsei kanbō 流行性感冒 (Epidemic influenza). According to this source, there were in total 23,580,495 patients and 385,029 deaths in Japan caused by influenza during 1918-1920.[112] In recent research however, there have been multiple attempts at recalculating these numbers, resulting in numbers of deaths ranging from 257,363 up to 2,020,000, as can be seen in Table 1**Fout! Verwijzingsbron niet gevonden.**. The reason for this variation in the numbers of deaths from the influenza lies within the different sources upon which researchers rely, the different methods they use to calculate casualties from the influenza epidemic, and their different conceptions of what casualties are to be ascribed to the influenza pandemic. The historians George W. Rice and Edwina Palmer are the only ones who

argue that the actual numbers of deaths from the influenza epidemic must have been lower than reported by the Sanitary Bureau. They relied on the numbers of the Sanitary Bureau report, arguing that these were accurate. However, they only included the numbers of the early epidemic of 1918-1919. They argue that the virus of the original "Spanish flu" underwent mutations and that an antigenic shift had happened between the early and late epidemic, which lead them to see the late epidemic of 1919-1920 as

[112] The report actually gives a slightly larger number of casualties (388,727 deaths), as it also includes deaths of influenza from the season of 1920-1921. Because it has been established by more recent research that the 1920-1921 influenza cases are comparable to those in a regular influenza season, these deaths are not included in the numbers caused by the influenza pandemic here. Naimushō Eisei-kyoku 1922, p. 85.

a separate epidemic with a different cause. As a result, their numbers for victims of the influenza pandemic in Japan are the lowest, with a morbidity of about one third of the population, and a death rate of 0.45%. Based on these remarkably low numbers compared to other Asian countries, Rice and Palmer sought an explanation for Japan's exceptionally low mortality during the pandemic.[113] Whether there was an antigenic shift or not, is at this moment hard to find out. However, even if the cause of the late epidemic was a slightly mutated version of the original virus, in this paper it will still be considered part of the epidemic influenza of 1918-1920. Additionally, in other countries too, the victims of the epidemic influenza were counted regardless of an antigenic shift, and therefore it seems more correct to present the numbers in Japan in the same way.

On the other hand, there also has been research which concludes that Japan was not an exception in South Asia, but argues that the generally accepted numbers of deaths in Japan are a severe underrepresentation of the actual situation. This research conducted by the economist Siddharth Chandra was based not on the vital statistics of the number of deaths, but on the population count data per prefecture in Japan and resulted in a number close to five times as high as the number of the Sanitary Bureau.[114] However, this exceptionally high number has been questioned by other researchers, who argue that statistics of all-cause mortality are more reliable than the demographic calculations on which Chandra relied.[115] The problem which is closely related to this discussion, is that of the different demographic counting systems before 1918 and after 1920. Complete censuses of the population of Japan and colonial areas were taken only from 1920 onwards every five years until 1940. Before that, population surveys were held every five years based on the *koseki* 戸籍 (household registration) system in the period from 1898 until 1918. This latter registration method is deemed to have had many difficulties because the initial registers were not accurate, and because of issues regarding registrations of migration.[116] This means that the changes in population observed in demographical data of the period between 1918 and 1920 cannot solely be ascribed to the influenza epidemic, but also have to be ascribed to the shift to a new national census system. This inconsistency in population numbers in the period in which the influenza pandemic took place, further complicates the attempts to estimate the impact of the influenza. Other researchers therefore opted not to rely on demographical data, but on epidemiological records and vital statistics. While some

[113] Rice and Palmer 1993, p. 394.
[114] Chandra 2013, p. 617.
[115] Nishimura and Ōkusa 2016, p. 15.
[116] Taeuber 1958, pp. 40-42; 59.

scholars rely solely on the numbers of the *Ryūkōsei kanbō* report [117], the numbers of this report are generally accepted to be fairly complete, but still an underrepresentation of the actual casualties. Instead, the vital statistics of the Naikaku Tōkei-kyoku 内閣統計局 (Cabinet Statistics Bureau) are often utilized.[118] One reason for using these statistics instead of those of the Sanitary Bureau, is that the Sanitary Bureau did not include a description of the criteria that were utilized when counting patients and deaths of influenza, while the Statistics Bureau published the *Nihon Teikoku shiin tōkei* 日本帝国死因統計 (Statistics of causes of death in the Empire of Japan), giving all death causes. Although the Sanitary Bureau seems to have included not only influenza deaths, but also deaths from respiratory diseases, they do not make it clear, which is why scholars prefer the transparent numbers of the Statistics Bureau, also because they would be qualitatively better, as Hayami argues.[119]

Epidemiologists calculate the 'excess death', which is the comparison of the increased mortality during an influenza epidemic, compared to the average number of deaths in comparable periods without an influenza epidemic.[120] Depending on the period which was used as 'normal' years, the numbers of excess deaths may defer. For example Hayami looked at the corresponding months in which the epidemics took place in the years 1916-1921 and compared those to the epidemic season of 1918-1919 to calculate excess deaths, which can be attributed to the influenza and complications from influenza, as there is no other major death cause known in that period.[121] The epidemiologist Stephanie Richard and her team took a slightly longer period, from 1915 until 1923, and when they calculated excess deaths, they found a slightly higher number of deaths.[122] The public health historian Ōmi Ken'ichi 逢見憲一 looked at an even longer period, namely from 1900 until 1938, and his calculations for the excess deaths are somewhat in the middle between the results of Hayami and Richard et al.[123] Some other research has been done with specific primary sources at the base, like the medical records of patients of the Tōkyō dai ichi eiju byōin 東京第一衛戍病院 (Tokyo First Army Hospital) and the Dai go rikugun byōin 第五陸軍病院 (Fifth Japanese Army Garrison Hospital) in Russia, which gave some more detailed information on the conditions of patients in the early and late epidemic.[124] Additionally,

[117] Ikeda et al. 2005.
[118] Nishimura and Ōkusa 2016 ; Hayami 2006 ; Richard et al. 2009.
[119] Hayami 2006, p. 111.
[120] Shors 2017, p. 396.
[121] Hayami 2006, pp. 110-11.
[122] Richard et al. 2009, pp.1063-64.
[123] Ōmi 2009, p. 241.
[124] Kanawa et al. 2007, p. 590; Kudō et al. 2017, p. 662.

sometimes detailed local historical records remain, which was the case in Kanazawa prefecture, leading to a comparison of the rural and urban experience of the pandemic.[125]

It can be concluded that, although there is some discussion about what to use as a definition of a death caused by the influenza pandemic, and about what demographical or vital statistics to trust, there are some aspects on which researchers agree. One such aspect is the difference between the early and late epidemic. While the early influenza epidemic was widespread with a low mortality rate, the following late epidemic was on the contrary less widespread but had a high case fatality rate. Secondly, the most unique characteristic of the influenza pandemic of 1918-1920 was that it was extremely virulent amongst healthy adults between 25 and 44.[126] Further, it is hard to compare countries due to the variation in registration practice, either counting the deaths from pneumonia separately from influenza deaths, or adding them up to one number, but as the most epidemiological evidence supports, Japan's influenza fatalities remained at about 500,000 deaths, which accounted for approximately 0.89% of the population at the time.[127] This number is low compared to other East Asian countries, but similar to the experiences in Europe and North-America. The experience of, for example, the USA and UK was similar to that of Japan, with the difference that Japan suffered a considerable amount of its casualties during the second epidemic season, while the USA and UK suffered their largest losses in the first wave in 1918.[128]

A last note that is important on this subject, is that the above numbers only account for mainland Japan and do not include its colonies for which statistics were held separately. Due to these statistics often being less complete, it is hard to calculate excess death and compare to the Japanese mainland, however what can be observed from the available data, is first that the spread of influenza in the colonies was similar to that of mainland Japan with in some places a herald wave, then followed by a first and second wave. Another remarkable finding is that in the colonies the mortality was lower amongst the Japanese residents compared to the local people, as was the case in Korea, Kwantung and Taiwan. A possible explanation is that the Japanese residents had better access to hospitals.[129] In Kantō shū 関東州(the Kwantung Leased Territory)

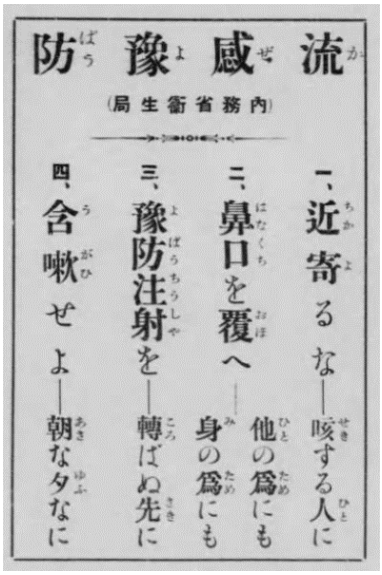
[125] Nishiura and Gerardo 2008, p. 19.
[126] Ikeda et al. 2005, p. 371; Richard et al. 2009, p. 1066; Nishiura and Gerardo, p. 23; Kawana et al. 2007, p. 592 ; Rice and Palmer 1993, p. 399. Hayami 2006, pp. 112-14.
[127] This percentage was calculated for the population of 55,963,053, as reported in the 1920 population census, e-Stat Portal Site of Official Statistics of Japan. Population Census, https://www.e-stat.go.jp/en/statistics/00200521 last accessed 2021/04/16.
[128] Richard et al. 2009, pp. 1066-68.
[129] Hayami 2006, pp. 193-95.

in North-Eastern China there were no independent statistics compiled, but the territory was included in the statistics for overseas territories in the *Nihon teikoku tōkei nenkan* 日本帝国統計年間 (Imperial Japan statistical yearbook) and the newspaper published in Dairen, today's Dalian, called *Manshū nichinichi shinbun* 満州日日新聞 (Manchuria daily newspaper) gives some insight in the situation there. Measures in Kwantung were harsher than in mainland Japan, as also entertainment establishments were closed down. Especially the Kwantung garrison was badly affected by the second epidemic, with morbidity and death rates that placed it second highest amongst Japan's 20 divisions and five garrisons.[130]

[130] Hayami 2006, pp. 194-196.

3.3. Preventive Measures against the Epidemic Influenza

General measures against the epidemic influenza of 1918-1920 were spread by the Sanitary Bureau as can be read in the *Ryūkōsei kanbō* report. According to the report, 480,000 leaflets were planned to be distributed on 19 January 1920 to all prefectures with the following contents:



Prevention of epidemic influenza

(Sanitary Bureau of the Home Ministry)

1. Do not get close --- To people who cough

2. Cover your nose --- For others, for yourself

3. Get a preventive vaccine---Better safe than sorry

4. Gargle ---In the morning and evening [131]

Figure 2 Leaflet with guidelines against the epidemic influenza published in the Ryūkōsei kanbō, Naimushō Eisei-kyoku 1922, pp. 130-31

This message shown in Figure 2 was a shortened version of the slightly longer guidelines that had been made public in January 1919. This earlier version, which was titled *Ryūkōsei kanbō yobō kokoroe* 流行性感冒予防心得 (Guidelines for prevention of epidemic influenza), went into detail about how one could contract the disease, what to do to prevent infections, and about what to do upon infection.[132] The same measures, encouraging people to wear a mask on public transportation, to gargle, and to get vaccinated, were also visualized and spread in each prefecture in the form of posters beginning from 7 February 1920.[133] From the timing of these public announcements, it becomes clear that only after the early epidemic of the fall of 1918, concrete guidelines were communicated. During the late epidemic of the spring of 1920, these guidelines were in place and were repeated during the peak, as is to be seen from the leaflets and posters that were spread in late January and February.

Although it is not certain how widely these posters and public announcements were exactly spread, it is clear that the Sanitary Bureau put a great deal of effort into

[131] Translation of the leaflet as it appeared in Naimushō Eisei-kyoku 1922, pp. 130-31.
[132] Naimushō Eisei-kyoku 1922, pp. 119-20.
[133] The posters were included in the report as attachment between the pages 132-33 and 150-51. Naimushō Eisei-kyoku 1922, pp. 131-33; 149-51.

spreading the guidelines. In addition to communicating through newspapers and magazines, the ministerial bureaucrats of the Sanitary Bureau utilized their networks to diffuse the above mentioned posters and leaflets. Posters were put up in public places where large numbers of people would see them, such as theaters, bath houses, hairdressing parlors, train carriages, and factories. Leaflets were distributed to pupils in elementary schools in order to reach their families, but were also airdropped by plane with help of the Army and Navy air force in Saitama prefecture, for example. Furthermore, it becomes clear from the usage of *furigana* 振り仮名[134] and visual elements such as the representation of the invisible influenza as a little devil sneaking into houses and infecting people, that the posters were intended to be understandable for everyone, including less literate people and children.[135]

The first measure, that of not getting too close to other people, especially when they cough, was translated concretely into the advice to avoid large crowds. Elementary and secondary schools were closed down when there were contagions among the students, but apart from in the Kwantung Leased Territory, entertainment was rarely closed down. Additionally, people were encouraged to limit the spread of the disease after one had caught it, by keeping sick members of the household in a separate room, and by refraining from coughing in the vicinity of other people.[136]

The second guideline was the covering of one's nose, in other words the wearing of a mask. These masks were advised for everyone in all public places, but were compulsory for police in 12 prefectures and for all members of the armed forces. Additionally, people were required to put on masks in some theaters and cinemas, and in public transport. Although at first masks were short in supply, they were soon produced by girls at schools and then distributed by voluntary organizations such as the Aikoku fujin kai 愛国婦人会 (Patriotic Women's Association), the Shiritsu eiseikai shibu 私立衛生会支部 (subdivisions of the Private Hygiene Association), the Sekijūji sha shibu 赤十字社支部 (subdivisions of the Red Cross), the Hana no hi kai 花ノ日会 (Flower Day Society)[137] , and the Bukkyō fujin seinen kai 佛教婦人青年会 (Buddhist Women's and Young Men's Associations).[138]

The measure of preventive vaccines is the most important one for this thesis, as here the academic institutions played an important role in providing the vaccines and

[134] These signs are written next to characters and function as a reading aid, indicating the pronunciation.
[135] Naimushō Eisei-kyoku 1922, pp. 151-52.
[136] Hayami 2006, p. 210; First poster after page 150, third poster after page 132. Naimushō Eisei-kyoku 1922, pp. 131-33; 150-51.
[137] Flower's day seems to be an event initiated by the Protestant organizations in Japan.
[138] Naimushō Eisei-kyoku 1922, p. 161. Rice and Palmer 1993, p. 402.

assuring that they were effective. The official report of the Sanitary Bureau stated that at the time of writing, in 1922, scholars still had not reached an agreement on the origin of the disease. The vaccinations that were recommended during the epidemic episodes of 1919-1920 therefore were produced based on the results of repeated experiments, not on commonly accepted theory. Temporary vaccination centers were set up in each prefecture and vaccination teams were prepared to be sent to various places where signs of an epidemic were observed. The vaccine was strongly encouraged by the Sanitary Bureau and during the peak of the late epidemic of January and February 1920, the demand rose sharply, leading to shortages in the supply of vaccines. Consequently, the planned implementation of preventive vaccines could not be completed in most prefectures. In total, approximately 5 million people were vaccinated, which accounts for roughly 8.9% of the population. In Tokyo, 33 places where normally doctors commissioned to smallpox vaccinations operated, were reformed into temporary influenza vaccination centers with prefectural funding and at night students of medicines provided vaccinations free of charge for the poor of the city. In most prefectures, members of the police department and government were vaccinated first. Other people who were often inoculated at least partly on prefectural budget, were pupils and staff in schools, nurses and doctors in hospitals, and sometimes prostitutes. In prefectures such as Shizuoka, Shiga, and Ehime, part of the costs of vaccination was covered by the social welfare organization called Onshi zaidan saiseikai 恩賜財団済生会 (Saiseikai Imperial Gift Foundation).[139]

While some prefectures, such as Kanagawa prefecture, produced their own vaccines, most vaccines were bought from the Kitasato kenkyūjo 北里研究所 (Kitasato Institute) or the Tokyo Imperial University affiliated Densenbyō kenkyūjō 伝染病研究所 (Institute for Infectious Diseases). As both institutes disagreed on the pathogen of the disease, their vaccines were different in composition. The Kitasato Institute believed the Pfeiffer's bacillus[140] to be the origin of the influenza epidemic, so it produced vaccines against this bacillus. The Institute for Infectious Diseases on the other hand, believed that the causative agent was still unknown and manufactured "mixed vaccines" consisting of a variation of pneumococci and diplococci targeting secondary complications such as pneumonia.[141] From the advertisement section of the international magazine of the Kitasato Institute, the cost of the "anti-influenza serum" can be deducted. As Yabe Sennosuke 矢部専之助 (1886-?) wrote that for the

[139] Naimushō Eisei-kyoku 1922, pp. 177-85
[140] This bacterium is today referred to as *haemophilus influenzae.*
[141] Naimushō Eisei-kyoku 1922, p. 327, Utsui 1920a, p. 570.

vaccination of an adult, the amount of serum needed was 0.5cc for the first, and 1.0cc for the second vaccination, and the price for the serum was 2.00 yen for 20cc, the vaccination of one person would cost approximately 0.15 yen.[142] As a comparison, a farmer household living near Yamagata city spent 82.1 yen on medical care per year in 1923.[143] However, as many of the vaccines were procured by the local governments, people would probably have received the vaccine at a reduced price.

Although many vaccination centers were prepared in the capital city, in the case of rural places the access to vaccines seems to have been limited. As a result, local physicians experimented with their own vaccines. One such example is the case of the physician 五味淵伊次郎 Gomibuchi Ijirō (1885-1925), who had his practice in the rural district Yaita 矢板町 in Tochigi prefecture. During the influenza epidemic, this physician used a diphtheria serum, which had been invented by Emil Adolph von Behring (1854–1917) and Kitasato Shibasaburo 北里 柴三郎 (1853–1931) claiming that, although the epidemic was not caused by a germ of the diphtheria family as he first thought, the serum was effective against the pneumonic complications.[144] Important to keep in mind regarding these vaccines, is that while they might have been promoted widely and while about 1 out of 10 of the Japanese population might have received a vaccine, not one of the available vaccines at the time was effective against the epidemic influenza, as the causative virus was not yet discovered. However, as the vaccines targeted secondary implications such as pneumonia, they might arguably have helped to prevent or treat those, although on this subject as well, there is no sufficient evidence.[145]

The last measure was that of gargling with a slightly heated solution that consisted mainly of saline water and boric acid, as it was believed to prevent upper respiratory tract infections. This gargling solution was available for purchase to all households and sold at train stations. Additionally, it was provided at schools, police stations, and prefectural hygiene associations free of charge. It was recommended to gargle both in the morning and evening, and after going out.[146]

Alongside these public health measures, home remedies such as the traditional Chinese style herbal medicine practice called *kanpō* 漢方, might have played a role in treating patients. One argument for this is that the official preventive measures were

[142] Kitasato Institute for Infectious Diseases, *The Kitasato Archives of Experimental Medicine*, Vol. 5, no. 1 (March 1922), p. 1. ; Yabe 1922, p. 68.
[143] Nakanishi and Futaya 2011, p.118-22
[144] Gomibuchi 1919, pp. 8, 25-26; Rice and Palmer 1992b, pp. 562-64.
[145] Rice and Palmer 1992b, p. 575; Hayami 2006, p. 80.
[146] Naimushō Eisei-kyoku 1922, p. 162; Fourth poster after page 132, second poster after page 150. Naimushō Eisei-kyoku 1922, pp. 131-33; 150-51.

only promoted after the early epidemic had subdued. Moreover, Palmer and Rice argue that most people seem to have been treated at home because there were only 50,853 registered doctors and 1,237 hospitals for a population of about 55 million in 1918, which means that there were 10,800 people per doctor. However, from a more detailed survey of the number of doctors during the influenza pandemic of 1918-1920 conducted by a medicine scholar of Kyūshū Imperial University in 1926, it can be understood that the number of doctors per habitants was a bit higher and varied depending on the region, ranging from 12.6 doctors per 10.000 inhabitants in Tokyo and only 2.36 doctors per 10.000 inhabitants in Okinawa. Moreover, the additional 98,000 sickbeds that were prepared for patients with infectious diseases should be taken into account as well. Nuancing the number of Palmer and Rice in this way, it still seems that in some areas the number of doctors was indeed low and this lack of professional medical treatment might have had consequences for the influenza patients in those areas as the survey of 1926 found that the death rate was higher in places where there were fewer doctors.[147]

[147] Palmer and Rice 1992a, p. 319; Rice and Palmer 1992b, pp. 575-76; Rice and Palmer 1993, pp. 389, 400; Ikai 2010, pp. 241-43. Tanaka 1926, pp. 256-57. As a comparison: according to statistics of the WHO, Japan counted 24.8 doctors per 10.000 habitants in 2018. https://www.who.int/data/gho/data/indicators/indicator-details/GHO/medical-doctors-(per-10-000-population), last accessed May 28, 2021.

4. Analysis: Experiences of the Authors and Discourse of the Articles

This chapter will go deeper into the details of what Japanese experts of medicine wrote about the pandemic, and with what backgrounds they faced the disease. The analysis of academic articles in medical journals and the experts who wrote them, will be twofold. In the first part, the concept of "space of experience" as developed by historian Reinhart Koselleck (1923-2006), will be utilized to analyze the background of the authors of the academic articles, in order to establish how their past experiences influenced their view upon the influenza pandemic. In the second part of the analysis, the primary sources will be subject to a discourse analysis, following the theory of linguist Norman Fairclough as adapted for historians by Marnix Beyen. In this analysis, the sources will be read closely in order to find out how the authors built their discourse to support their view upon the epidemic influenza. Combining these two approaches, the thesis hopes to bring to light how the "space of experience" of the authors influenced the discourse in their writings about the epidemic influenza. Before diving into the analysis, the primary material and the way it was gathered will be introduced.

4.1. Primary Material: Academic Articles in Medical Journals

Regarding primary materials on the epidemic influenza of 1918-1920 in Japan, there is an abundance of publications in various medical journals in which authors from different medical fields discussed the origin, possible measures, and the influenza pandemic itself. For the purpose of this thesis, the scope was limited to 24 academic texts published between 1918 and 1926.[148] These texts were selected based on several criteria, of which the first one was that the subject of the articles was the epidemic influenza of 1918-1920. A search in online databases such as CiNii and the Kokuritsu kokkai toshokan dejitaru korekushon 国立国会図書館デジタルコレクション (National Diet Library Digital Collection) indicated that the term *ryūkōsei kanbō* 流行性感冒 (epidemic influenza) was not only used for the pandemic of 1918-1920, but had been used for the previous pandemic in 1889-1890 as well. A search with the term of *ryūkōsei kanbō* yielded 73 results for the period between 1890 and 1892, and in 52 results for the period of 1918-1921 in the National Diet Library Digital Collection.[149]

[148] An overview of the primary sources can be found in the appendix p. 83.

[149] National Diet Library Digital Collection, results for the keyword "流行性感冒", https://dl.ndl.go.jp/search/searchResult?fulltext=1&searchWordFulltext=%E6%B5%81%E8%A1%8C%E6%80%A7%E6%84%9F%E5%86%92&searchWord=%E6%B5%81%E8%A1%8C%E6%80%A7%E6%84%9F%E5%86%92&featureCode=all&viewRestrictedList=0 , Last accessed 2021/05/10.

The largest part of the texts identified in this way can be found in the *Kanpō* 官報 , the Official Gazette of the Japanese Government in which laws and orders were announced and in which other documents were published. Therefore they were likely descriptions of the circumstances of the 1889-1890 pandemic and the promulgations of ordinances at the time. However, these results also include articles from medical journals such as the *Chūgai iji shinpō* 中外医事新報 (Domestic and foreign medical practice news), indicating that epidemic influenza was already a subject of study at least 30 years before the pandemic of 1918-1920.

A second criterion for the selection was the availability of the full text of the medical articles, as this is necessary to conduct a discourse analysis of a text. Because of this, the sources are limited to primary material that was digitized, or materials that were accessible in Belgium, as due to COVID-19 documents in Japan could not physically be obtained. However, a considerably large amount of material is digitized and accessible via the homepages of the National Diet Library, and the search for sources on the epidemic influenza of 1918-1920 yielded about 55 primary sources.

The third and fourth criteria were that on the one hand the academic texts were written by Japanese authors, and on the other that about these authors biographical data was available. This last criterion was especially important because of the analysis employing the concept of "space of experience" utilized in this thesis, for which biographies are necessary as it considers what the authors experienced in their lives before writing their academic articles. Due to these two last criteria, several texts of interest could not be included into the selection. A text that was not used due to insufficient information on the author, for example, was a book with one chapter on the epidemic influenza and an afterword written in Esperanto for an international audience.[150] Often authors were hardly to be found in any encyclopedia or dictionary and accordingly it was decided to broaden the criterion so that if biographical information of at least one of the authors of an article was available, it could be included. However, all experts who obtained a doctoral title in medicine were included in the *Dai Nihon hakushi roku* 大日本博士録 (*Who's who in "hakushi" in Great Japan)*, which is a bibliographical dictionary of scholars with the academic title of *hakushi* 博士 (doctor) in Japan, and which became the main source for bibliographical data on the authors considered in this research. [151] As a result of this selection process, there were carefully chosen 24 articles as primary sources available as full text for

[150] Murata 1922, pp. 217-19.
[151] For this research, volumes 2 to 4 of the *Who's who in 'hakushi' in Great Japan* were consulted, as these contain all medical doctors. Iseki 1926; Hattensha 1930.

discourse analysis and sufficient biographical information on the authors for the study of the "space of experience".

These articles were published in several magazines, and written by Japanese experts from various medical fields and institutions. Most of them were published in Japanese, but some were published abroad in English. For example, the article written by Yamanouchi Tamotsu 山内保 (1880-?) and his colleagues about the infecting agent of influenza was published in *The Lancet* in 1919. *The Lancet* was a well-established medical journal already in the late 1910s and early 1920s which was known for publishing original research as well as reviews, correspondence, news, and case reports. As a result, the article by Yamanouchi and colleagues was often referred to in Western literature about the "Spanish flu".[152] Furthermore, the Kitasato Institute for Infectious Diseases started publishing an international journal in 1917, the *Kitasato Archives of Experimental Medicine*, in German, English, and French. During the years of the pandemic and in the three years following it, this journal published several articles on vaccination in general and three articles specifically about the origin of and vaccination against the epidemic influenza of 1918-1920, which are included in the primary sources used in this thesis.[153] Another journal called *Chūgai iji shinpō* 中外醫事新報 (Domestic and foreign medical practice news), out of which four articles are included here, covered topics ranging from domestic to international medicine, with a total of 1,286 numbers published between 1880 and 1940. The publisher was the Nihon ishi gakkai 日本医史学会 (Japanese Society for the History of Medicine) and the journal's content was a combination of original articles by Japanese authors and Japanese summarized translations of articles from foreign medical journals. In the period between 1918 and 1933, *Chūgai iji shinpō* published 18 articles about epidemic influenza, of which five articles were written originally in Japanese, and the remaining 13 articles were translated summaries of articles which had appeared 3 to 5 months earlier in foreign medical journals such as the *Wiener Klinische Wochenschrift, The Lancet, Paris Médical, American Review of Tuberculosis, The Journal of the American Medical Association, the Münchener Medizinische Wochenschrift, Deutsche Medizinische Wochenschrift* and *the American Journal of Diseases of Children.*[154] The many translated summaries in this journal indicate that there was international

[152] Yamanouchi et al. 1919, p.971 ; Eyler 2010, p. 32; Fueshko 2014, p. 41.
[153] Kitasato Institute for Infectious Diseases, *Kitasato Archives of Experimental Medicine*, Vol 2. No.1. until Vol. 5. No. 3 (1918-1923). A full overview of the articles concerning vaccination and epidemic influenza published in this journal is included in the appendix p. 80.
[154] Nihon Ishi gakkai, *Chūgai iji shinpō*, Vol. 927 until Vol. 1101 (1918-1926). A full overview of the articles concerning the epidemic influenza published in this journal is included in the appendix p. 81.

exchange in the medical field and that Japanese medical experts were aware of the developments abroad.

The other articles were selected from various domestic journals. For example five articles that appeared in the *Igaku chūō zasshi* 医学中央雑誌 (Medical central magazine) were selected. This journal was published in Tokyo by a company named after the journal: Igaku chūō zasshi sha 医学中央雑誌社 (Company of the Medical central magazine) between 1903 and 2002, for a total of 3,822 numbers. A search of the indexes of this journal revealed that a total of eight articles with "epidemic influenza" in the title were published in the journal, all in the years 1918-1921.[155] Nine articles were taken from other medical journals of various specialized medical fields such as bacteriology, otorhinolaryngology, and internal medicine.[156] The last primary source taken into account for this study is a chapter of a book, written by a doctor in both physics and medicine, Matsushita Teiji 松下禎二 (1875-1932), which is interesting in comparison to the journal articles.[157] The 24 primary sources were, as will be discussed in the analysis of the backgrounds of the authors, written by scholars of a variety of medical institutions. Consequently, this sample of sources is not of such an amount that it can be seen as representative for the whole of what was written about the topic of the epidemic influenza in Japan, but it is a considerably varied assemblage of sources which represents different journals, different institutions, and different fields of medical research. Additionally, some of the authors of these articles were contacted as advisors by the Sanitary Bureau of the Home Ministry, indicating that they at the time were considered experts. The 1922 *Ryūkōsei kanbō* report of the Bureau for example mentioned Sasaki Hideichi 佐々木秀一 (1878-?), who advised sufficient bed rest for patients, as well as the Kitasato Institute in its whole, recommending the influenza bacteria serum and diplococci serum, and Onodera Naosuke 小野寺 直助 (1883-?) who recommended an alkali treatment.[158]

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[155] Igaku Chūō zasshi kankōkai, *Igaku chūō zasshi*, Vol. 16 until Vol. 18 no. 15 (1918-1921). A full overview of the articles concerning the epidemic influenza published in this journal is included in the appendix p. 82.

[156] The journals of which articles were included are: *Nihon naika gakkai zasshi* 日本内科学会雑誌 (Japan internal medicine association journal), *Nihon shōka kibyō gakkai zasshi* 日本消化機病学会雑誌 (Japan digestion diseases academic society journal), *Jikken igaku zasshi* 実験医学雑誌 (Experimental medicine journal), *Dai Nihon jibiinkōka kai kaihō* 大日本耳鼻咽喉科會會報 (Greater Japan otorhinolaryngology association bulletin) , *Saikingaku zasshi* 細菌學雜誌 (Bacteriology journal), *Kanazawa igaku senmon gakkō 10 zenkai zasshi* 金澤醫學專門學校十全會雜誌 (Kanazawa medical college 10th whole assembly journal), and *Juntendō igaku* 順天堂医学 (Juntendō medical magazine).

[157] Matsushita 1920.

[158] Naimushō Eisei-kyoku 1922, pp. 321-24.

4.2. Framework: "Space of Experience"

For the first part of the analysis, the concepts of "space of experience" and "horizon of expectation" as formulated by the German historian Reinhart Koselleck will be utilized as the framework of analysis. Focusing especially on the "space of experience", Koselleck's concepts will be applied on the biographies of the authors of the primary sources, who were all active in the medical field at the time of the influenza pandemic. Taking into account all co-authors of the 24 articles, the total number of authors amounted to 32. However, only for 20 of these authors biographical data was available, and consequently only for them it is possible to attempt to reconstruct what might have been part of their "space of experience". They all obtained the title of doctor in the medicines and therefore basic biographical information on them was available in the *Who's who in "hakushi" in Great Japan*.[159] By way of reconstructing the spaces of experience of the authors, to the extent this is possible, this chapter hopes to bring to light where their view on the epidemic influenza and their expectations of how the situation would evolve, came from.

Koselleck's concepts of "space of experience" and "horizon of expectation" are two categories that represent the past and future as experienced by people in the present at any moment of time, and therefore are indicative of the temporality of people and of history. Although both concepts are centered around the present, they are not each other's mirror images. A "space of experience" is a totality of many layers of earlier times which are all present at once, without chronological order, while expectation is a horizon, after which a not yet to be seen new "space of experience" will open. In this way, the "space of experience" draws the "horizon of expectation" and directs prognoses for the future. Koselleck used these categories to explain the feeling of acceleration and progress in the late 18th century: as there was a rupture, a distance, between experiences and expectations which until then allegedly seamlessly passed over into one another, people started to expect change instead of continuity, and the horizon of expectation widened. A "space of experience" consists both of the personal experience of the present past, as is remembered by the individual, and of elements of experience of others, which are conveyed by institutions and previous generations.[160] In order to discern what exactly is part of those personal and collective experiences, the theory of Koselleck will be supplemented with theories regarding communicative memory, historical institutionalism, paradigms, and generations.

[159] Iseki 1926; Hattensha 1930.
[160] Koselleck 1979, pp. 258-63.

Building on earlier work on collective memory by sociologist Maurice Halbwachs, egyptologists and literature scholars Jan and Aleida Assmann claimed that collective memory can further be divided in a cultural and a communicative memory. This thesis will use their concept of communicative memory, which they define as the memory of everyday life interaction. This communicative memory is an extension of one's personal experiences back into the past, communicated and passed down by former generations. According to the theory, communicative memory reaches back as far as three interacting generations, which is about 80 years.[161] At the time of the 1918-1920 pandemic, the communicative memory therefore would have gone back until approximately 1840. This means that the medical experts at the time of the pandemic of 1918-1920 would have been part of a collective memory that can be called a communicative memory, which spanned the period from about 1840 to the 1910s. For the purpose of this thesis close attention will be paid to episodes of infectious diseases, and measures and treatments taken against those diseases in this period.

As all authors were medical experts, the academic institutions to which they belonged cannot be ignored. For the purpose of understanding how institutions affect individual actors, historical institutionalism and its path dependencies will be utilized. As political scientist Paul Pierson put it: "path dependence refers to dynamic processes involving positive feedback, which generate multiple outcomes depending on the particular sequence in which events unfold".[162] What starts at first as a dynamical process becomes inflexible, because further down one path it becomes harder to choose a different path, although the current path is inefficient. Applying this path dependency to institutions, shows that institutions pave paths that over time make it increasingly unattractive for individuals to reverse from those paths.[163] For the experts in academic institutions, this might mean that it is hard to go against the knowledge that is passed down within the institution of which they are part. Connected to but transcending the specific institutions of which the experts were part, is the paradigm which was prevalent in the medical field. Thomas Kuhn claimed that a paradigm is a universally recognized scientific achievement which for a time provides a community of practitioners with solutions.[164] As will be discussed in more detail below, at the time of the "Spanish flu", the paradigm within the field of preventive medicine was that of bacteriology led by the renowned Robert Koch (1843-1910). However, throughout the pandemic contradictory theories came to the surface, challenging the dominating

[161] Assmann 2008, p. 111.
[162] Pierson 2004, p. 20.
[163] Pierson 2004, p. 18, 35.
[164] Kuhn 1970, p. iii.

paradigm. As Kuhn showed that theories compete with each other until the ideas of a successful paradigm displace the ideas of the old paradigm, [165] the discussion sparked by the pandemic, with new ideas contesting the old ones, could arguably be seen as the beginning of a paradigm shift.

Lastly, how one experiences the past, or remembers it, is also partly determined by the generation of which one is part. Historian Jürgen Reulecke summarized definitions of "generationality", "generativity" and "generation", which come into use at this point. Reulecke sees two ways to define a generation. The first definition comes from statistics, where the term cohort is used, which refers to a group of people born around the same time. On the other hand, from a cultural- historical perspective, a generation can be defined as a group of people that grew up during the same formative era. [166] Related to this, is the concept of generationality. Generationality describes the construct of how a group of people with shared experiences perceives of itself, or how this group is perceived by others in the broader historical picture, and it attempts to give an explanation as to why different groups, or generations, perceive certain events or change differently. Reulecke describes how age groups with distinct generationality can be seen as communities of experience and carriers of memory, with each their own strongly formative experiences and specific ways to process those experiences, which makes each generation unique. Generations pass their legacy on to later generations, who might be engraved with the experiences of the previous generation, or on the other hand, might reject, re-interpret, or erase the narratives passed down to them.[167] A space of experience might thus differ amongst a group of people depending on their formative experiences. In the case of these doctors, a space of experience that is referred to in almost every article about the pandemic of 1918-1920, is the previous pandemic of 1889-1890. One can imagine that the way in which scholars experienced this previous pandemic, whether they could actively remember it from firsthand experience, or only knew about it from communicative memory as they heard their parents talk about it, or learned about it in their education, could have made a great difference in their perception and "horizon of expectation" regarding the ongoing epidemic.

[165] Anand et al. 2020, p. 1650.
[166] Reulecke 2008, pp. 119-121.
[167] Ibid., p. 123.

4.3. Reconstructing the authors' "Spaces of Experience"

Utilizing the concepts of communicative memory, historical institutionalism, paradigms, and generation discussed above, the biographies of the twenty experts who wrote the articles about epidemic influenza will be subjected to an analysis in order to –at least partially– reconstruct their "space of experience"

4.3.1. Communicative Memory: Past Diseases

The communicative memory of the doctors at the time of the pandemic of 1918-1920 would go back three interacting generations, which is estimated to be 80 years by Jan Assmann, and therefore in this case would be approximately until the year 1840.[168] While this period comprises much more than only developments in medicine that would be communicated to the next generations, this thesis will pay attention closely only to the infectious diseases and first steps of preventive measures against them such

Figure 3 Magic lantern slide depicting anthropomorphic representations of three common diseases in the Meiji period gathering around a well to infect it. From right to left:cholera (korera 虎列剌), the plague (kokushibyō 黒死病), and dysentery (sekiri 赤痢). The slide is entitled eisei ponchi 衛生ポンチ (Sanitation campaign) and was donated by Okumura Takie 奥村多喜衛 (1865-1951) to the UHM Library Digital Image collections

as isolation and vaccination. The reason for including this aspect of the communicated memory is that these past experiences with diseases and prevention measures presumably take an important place in the "space of experience" when dealing with a similar kind of situation in the present.

In the last eighty or hundred years leading up to the "Spanish influenza", more had been learned about diseases than in the thousand preceding years. Remedies, vaccines,

[168] Assmann 2008, p. 111.

and methods of limiting the spread of diseases such as smallpox, typhoid, malaria, yellow fever, cholera, and diphtheria had been discovered and had proven to be successful.[169]An example of a public health message against some infectious diseases can be seen in Figure 3. Looking at this image, it becomes clear that the medium of *gentō* 幻燈 (magic lantern), which was around in Japan since the late Edo period (1600-1868), was used to inform people about the infection process of diseases at the time such as cholera, the plague and dysentery.[170]The most significant epidemic diseases in early modern Japan (since 1600), were smallpox, measles, influenza, and diarrheal infections. The bubonic plague and epidemic typhus only became rampant in Japan after 1850, with the arrival of Western ships, after which they raged in Japan in the late 1850s and 1860s.[171] Additionally, the measles, which had before been sporadic in Japan, struck with high mortality in 1862.[172] As many of the diseases entered Japan from other countries, especially the cities around ports were at risk. Yokohama, for example, experienced in 1879 a cholera epidemic that spread through the city and the surrounding area. Because of the unequal treaties at the time, the Japanese government was limited in regulating foreigners who came into the country, but committees were set up to take measures against the cholera.[173] Cholera was epidemic again in 1919, during the influenza pandemic, and as it struck in East-Asia, it also affected Japan and its colonies.[174] Smallpox, which had been around for centuries, was epidemic in 1886, 1893, 1897 and 1905.[175] While the cases each year declined, the case-fatality rate remained around 25-30 percent. This meant that the disease only diminished because of prevention, not treatment. A vaccine against smallpox had been introduced and spread throughout Japan since 1849 with support of Dutch scientists, and the Eisei-kyoku 衛生局 (Central Sanitary Bureau) in 1885 demanded all citizens to register their vaccination results in the *koseki* 戸籍 (household register).[176] In the Russo-Japanese war (1904-1905) a non-infectious disease called beri beri or *kakke* 脚気, which was caused by a thiamin deficiency, was common among soldiers.[177] Already before the Russo-Japanese war, this disease was a point of discussion among medical scholars. In 1888, Kitasato published a criticism on the work of Tokyo scholars' discovery of the causative bacterium of the beriberi disease, which strengthened the rivalry between

[169] Crosby 2003, p. 10.
[170] Iwamoto 2002, p. 125.
[171] Jannetta 2014, p. 15.
[172] Jannetta 2007, p. 179.
[173] Ichikawa 2008, pp. 1-2.
[174] Chung 2014, p. 442.
[175] Jannetta 2007, p. 179.
[176] Jannetta 2007, pp. 145, 178; Miyajima and Buchanan 1923, p. 1.
[177] Hawk 2006, p. 1.

Tokyo scholars and Kitasato, especially because Kitasato's criticism was directed at Ogata Masanori 緒方 正規 (1853-1919) to whom he had been a research assistant in the past.[178] A disease which coincided partly with the 1918-1920 influenza pandemic is encephalitis lethargica, which is a lethal, epidemic brain infection. This disease was epidemic between 1918 and 1930, but although a temporal connection was observed, the relation between encephalitis lethargica and influenza remains unclear.[179]

In general, an important measure against infectious diseases in the Meiji and Taishō period, was the usage of *hibyōin* 避病院 (isolation hospitals) and *kakuri byōsha* 隔離病舎 (isolation wards) to isolate patients.[180] Other measures against infectious diseases, were the usage of vaccines. Not only the vaccine against smallpox, but also the vaccine against dysentery was common well before the influenza pandemic of 1918-1920. Bacteriologist and member of the Kitasato Institute Shiga Kiyoshi 志賀 潔 (1871-1957) discovered the dysentery bacillus in 1897, which was named after him (*Shigella Dysenteriae)* and since then the Kitasato Institute developed vaccines against the disease in Japan.[181] Lastly, influenza also had been epidemic before 1918, namely in 1847-48 and 1889-90.[182]

4.3.2. Historical institutionalism, path dependency, and paradigms

The second aspect of the "space of experience" that will be looked into here, is that of the different institutions to which the authors belonged as the paths carved out by an institution might have made experts dependent on that path. At the time of the epidemic influenza, four of the twenty authors discussed, namely internist Arai Tsuneo 荒井恒雄(1883-1971), internist Utsui Ryūta 碓居龍太 (1877-?), internist Yoshizawa Koreo 吉澤惟雄 (1884-?), and pathologist Satō Kiyoshi 佐藤清 (1883-?) belonged to Tokyo Imperial University of whom the latter two were involved in the Densenbyō kenkyūjo 伝染病研究所 (Institute of Infectious Diseases), which was affiliated to the university at the time. From Kyōto Imperial University four scholars were included: hygienist Fuji Teikichi 富士貞吉 (1890-?), pathologist Fujinami Akira 藤浪鑑 (1870-1934), microbiologist and bacteriologist Matsushita Teiji 松下禎二 (1875-?), and otorhinolaryngologist Nakamura Noboru 中村登 (1880-?). Another four scholars belonged to the Kitasato Kenkyūjo 北里研究所 (Kitasato Institute): bio-bacteriologist Koyama Ryō 小山諒 (1891-?), otorhinolaryngologist, bacteriologist and serologist Tanaka Tatsusaburō 田中達三郎 (1866-?), bacteriologist Watanabe Yoshimasa 渡邊

[178] Kim 2016, pp. 132-33.
[179] Morishima et al. 2002, p. 512; Maurizi 1985, pp. 1-2.
[180] Gōda and Matsumoto 2020, p. 2611.
[181] Kim 2016, p. 152; Fukumi 1985, p. 110.
[182] Satō 1920a, p. 227.

義政 (1882-?) and internist Yabe Sennosuke 矢部専之助 (1886-?). From Kyushu Imperial University the two internists Onodera Naosuke 小野寺直助 (1883-?) and Tanaka Kichizaemon 田中吉左衛門 (1886-?) were included. The remaining six authors each belonged to a different institution: the surgeon Shimizu Ryō 清水 亮 (1890-?) belonged to the Kanazawa igaku senmon gakkō 金澤医学専門学校 (Kanazawa Medical College), ophthalmologist Miyashita Sōsuke 宮下左右輔 (1882-?) was part of the Kōritsu Ōsaka ika daigaku 公立大阪医科大学 (Osaka Prefectural University College of Medicine), internalist Sasaki Hideichi 佐々木秀一 (1878-?) worked at the Kyōundō byōin 杏雲堂病院 (Kyōundō Hospital), the internist Sakakami Kōzō 坂上弘蔵 (1872-?) was responsible for the bacterial vaccine manufacturing in the Hoshi seiyaku kaisha 星製薬会社 (Hoshi pharmaceutical company) in Tokyo, internalist Yamanouchi Tamotsu 山内保(1880-?) had a medical practice in Paris, and finally, internist and bacteriologist Tsurumi Mitsuzō 鶴見三三 (1880-1951) was active in a hospital in Manchuria in Dalian entitled Kantō totokufu dairen ryōbyōin 関東都督府大連寮病院 (Kwantung Government-General Dairen hospital).[183]

These institutions include the places where most of the medical research happened at the time. In 1913, Tokyo Imperial University employed 24% of all medical research scientists, followed by Kyoto Imperial University with 22%, and Kyushu Imperial University with 6%. The Institute of Infectious Diseases employed 5% of medical research scientists and therefore was the highest in rank among non-university facilities. 41% of medical research scientists was affiliated to medical colleges and higher technical schools, such as the Kanazawa Medical College.[184] Although the authors of the articles belonged to the described institutions at the moment of writing their articles on the epidemic influenza, they often had studied at other institutions before. Of the twenty authors, nine graduated from Tokyo Imperial University, three from Kyoto Imperial University, two from Kanazawa Medical College, three from Saisei gakusha 済生学者 (a private medical school, which closed in 1903), one from Niigata igaku senmon gakkō 新潟医学専門学校 (Niigata Medical College), one from Chiba igaku senmon gakkō 千葉医学専門学校 (Chiba Medical College) and one studied at the Dai go kōtō chūgakkō igakubu 第五高等中学校医学部 (Medicine department of the Fifth Higher Middle School).[185] As a large number of the scholars graduated from Tokyo Imperial University, they shared a similar study background,

[183] Iseki 1926; Hattensha 1930.
[184] Bartholomew 1989, p. 164-66.
[185] More details about which scholar graduated from which university can be found in Table 2, p. 41.

although they entered different institutions after their graduation. The imperial universities had the custom to hire mostly persons who graduated from their own university. The Kitasato Institute on the other hand was a private institution and half of its scholars came from Tokyo University graduates, while the other half of the scholars came from other institutions such as Kyoto Imperial University, Okayama Medical College, and the Saisei Gakusha school.[186]

At the time of the epidemic influenza, the relations between these academic institutions were largely influenced by a rivalry between the renowned Tokyo Imperial University and the private institute of bacteriologist Kitasato Shibasaburō 北里柴三郎 (1853–1931). The institute affiliated to Tokyo Imperial University which was especially concerned with research of epidemic influenza, was the Institute of Infectious Diseases. This institute was originally founded by Kitasato Shibasaburō upon his return from Germany in 1882. As a result of existing frictions between Kitasato and scholars at Tokyo Imperial University, he decided not to take up a position at a university, but instead established his own private institute with the help of bureaucrat and hygiene specialist Nagayo Sensai 長与専斎 (1838-1902)[187], enlightenment scholar and founder of Keiō University Fukuzawa Yukichi 福澤諭吉 (1835-1901) and ministerial bureaucrat and politician Gotō Shinpei 後藤新平 (1857-1929)[188] in September 1882. However, it soon became clear that the institution would need government funding, which came in 1893, together with government intervention and influence of Tokyo Imperial University. Kitasato tried to keep his institution private, but in the end the institute came under control of the Naimushō 内務省 (Ministry of Home Affairs) in 1899 and was renamed Kokuritsu densenbyō kenkyūjo 国立伝染病研究所 (National Institute of Infectious Diseases). In 1914, the institute was affiliated with the Monbushō 文部省 (Ministry of Education) and as a consequence, it became a branch organization of Tokyo Imperial University in 1916 under supervision of Aoyama Tanemichi 青山胤通 (1859-1917) and Nagayo Matarō 長与又郎 (1878-1941). Kitasato was dissatisfied with this transfer and together with his students he retired from the institute and established the separate private Kitasato Institute. With the help of Kitajima Taichi 北島多一 (1870-1956), who was the chancellor of Keiō gijuku daigaku 慶應義塾大 (the later Keio University), Kitasato and the scientists of his institute established the Keiō igaku senmon gakkō 慶應医学

[186] Bartholomew 1989, pp. 164-66, 173.
[187] Nagayo Sensai was the first director of the Bureau of Hygiene and was a well-known pioneer of Japanese public hygiene, Chung 2014, p. 442.
[188] Gotō Shinpei was the successor of Nagayo Sensai as director of the Bureau of Hygiene, and became the first administrator of the colonial government in Taiwan, Chung 2014, pp. 444-45.

専門学校 (Medical School of Keio University) in 1916, and Kitasato became its first dean.[189]

Out of the tension between the two institutes flowed a division of Japanese medical specialists, in two large groups. While a clear demarcation was never made, on the one side stood the professors and graduates from Kyoto Imperial University and the Tokyo Imperial University Medical School, dominating the academic hierarchy and commanding most governmental and military medical offices, and on the other side stood graduates of private and provincial medical colleges with Kitasato in the center. The Tokyo group had the Tōkyō Ikai 東京医会 (Tokyo Medical Association) and later the Meiji Ikai 明治医会 (Meiji Medical Association) founded in 1898 at their center, and the private medical school graduates gathered at the Dai Nippon Ishikai 大日本医師会 (Greater Japan Medical Association) founded in 1893. It becomes clear that this tension was existent already well before the epidemic influenza, for example, when looking at the visit of the renowned bacteriologist Robert Koch (1843-1910) to Japan in 1908. While he was enthusiastically welcomed by a crowd, major academic journals did barely mention his visit and the medical faculty and students from the Tokyo Imperial University showed little interest. They perceived of Koch as a private guest of Kitasato, who had studied under Koch's guidance in Germany for seven years.[190]

Historian Liu Shiyung argued that the tensions between Kitasato and Tokyo Imperial University placed Kitasato's followers in a position outside of the mainstream Japanese medical world, leading them to take up positions outside of the Japanese archipelago, mainly in the colonies.[191] Of the authors discussed here, one example of an expert taking a position outside of the Japanese mainland is Tsurumi Mitsuzō. After his studies at Tokyo Imperial University he was an assistant at the Institute of Infectious Diseases between 1908-1912, when it was still under guidance of Kitasato, after which he went to work as a professor and chief of hygiene in the Kwantung Leased Territory in Manchuria that had been given to Japan as a result of the Russo-Japanese War (1904-1905).[192]

The rivalry between the Institute of Infectious Diseases and the Kitasato Institute manifested itself in confrontations in their research fields, and this was also the case at

[189] Kim 2016, pp. 134-35; Fukumi 1985, p. 109; Liu 2008, p. 53.
[190] Kim 2016, pp. 126-27; 132-33.
[191] Liu 2008, p. 51.
[192] Iseki 1926, p. 315.

the time of the epidemic influenza as was reported in newspapers at the time.[193] Both institutes had a different view on the cause of the influenza pandemic as they followed different theoretical paths of which it was hard to reverse. The Kitasato Institute reported early on, already in November 1918, to have discovered the pathogen of the influenza, which was according to their findings the same influenza bacterium that had been discovered by Richard Pfeiffer (1858-1945) in 1892.[194] It was logical for the Kitasato Institute to support the theory that the epidemic was caused by the influenza germ, as Kitasato himself had been part of the Institute of Hygiene of Berlin University which was led by Koch, when Richard Pfeiffer discovered the bacterium he claimed to cause influenza, known at the time as the Pfeiffer's bacillus.[195] The Kitasato fellows detected the influenza germ in patients and in the lungs of deceased patients which led them to conclude that it had to be the causative agent. Scholars of the rival Tokyo Imperial University Institute of Infectious Diseases on the other hand, supported the theory that the cause of the influenza was still unknown. They focused on other possible germs that could cause the disease and concluded that pneumococcus as a secondary intruder was the most plausible explanation. The discussion about the origin of the influenza pandemic was held worldwide and subdued only when the pandemic ended while the influenza germ could not be confirmed as a cause, leaving the field in confusion and without a clear explanation.[196]

As a preventive measure against epidemic influenza vaccines were produced, but in this matter as well, the discussion about which vaccines to use was split between the same two institutes as these were the two largest producers of vaccines. The Kitasato Institute made vaccines against epidemic influenza employing the same method they used for vaccines to battle dysentery, taking an pathogen that was inactivated by using heat, in this case the influenza germ, as basis. The Tokyo Imperial University affiliated Institute of Infectious Diseases produced a mixed vaccine based on both the influenza germ and pneumococcus. This was a vaccine for protection against pneumonia as a secondary infection. Although many experiments with both types of vaccines were reported to be effective, this is highly doubtful. As some contemporary scholars started to criticize, the experiments did not fulfill scientific

[193] "Byōgen kin nitsuite Kitasato ken to Den ken ga tairitsu" 病原菌について北里研と伝研が対立, *Jiji shinpō*, 24 November 1918. Taishō nyūsu jiten henshū iinkai 1987, p. 359; Hayami 2006, p. 211.
[194] "Kitasato kenkyūjo de byōgen kin wo mitsukeru"北里研究所で病原菌を見つける, *Tōkyō asahi shinbun*, 8 November, 1918. Taishō nyūsu jiten henshū iinkai 1987, p. 357.
[195] Taubenberger et al. 2007, p. 582.
[196] Fukumi 1985, p. 109.

standards as they did often not bother to administer the vaccines in a controlled environment, or did not use a randomized controlled trial.[197]

Although competition between the universities and private institutions existed, sometimes competition within one institution could be fierce as well, and on the other hand, sometimes rival institutions worked together. It is, for example, known that when simultaneously researching the so-called *tsutsugamushi* disease[198], the laboratories of pathology and hygiene at Tokyo Imperial University did not cooperate and even did not share information, personnel or facilities. On the other hand, Kitasato and Aoyama, although they were from two rival institutions, worked together on a major cooperative study about the plague in Hong Kong in 1894.[199] From the primary sources, some signs of interaction between institutions or, in other cases, lack thereof can be discerned. Fujinami Akira for example, was a scholar of Kyoto Imperial University, who was invited by Miura Kinnosuke 三浦謹之助 (1864-1950), who was a scholar of practical medicine at Tokyo Imperial University, to give a presentation about the epidemic influenza at a meeting of the Nihon naika gakkai 日本内科学会 (Japan Society of Internal Medicine).[200] Additionally, it becomes apparent from both the articles of Fujinami and Satō that they worked closely together in their research, although they were from Kyoto and Tokyo Imperial University, respectively.[201] On the contrary, Fujinami included a long list of approximately 30 institutes comprising both universities and colleges researching epidemic influenza, but did not mention the Kitasato Institute. This could be due to the Fujinami's focus on pathology which differed from the primarily bacteriological focus of the Kitasato Institute, but it could also be a sign that Fujinami did not esteem the research of the Kitasato Institute highly.[202] Other examples of connections between institutions or at least familiarity with the work of scholars of other institutions can be seen in the referring to other authors. Tsurumi Mitsuzō, who was active in Manchuria, for example referred to the work of Kitasato Institute scholar Yabe Sennosuke on leucopenia in order to make his argument concerning the cause of epidemic influenza being caused by the Pfeiffer's bacillus.[203] Also the other way around, Tsurumi's work was referred to by Kyushu Imperial University scholar Onodera Naosuke.[204]

[197] Fukumi 1985, p. 110; Utsui 1920a, pp. 568-69.
[198] *Orientia tsutsugamushi* is a bacterial pathogen that causes the mite-borne scrub typhus, Wongsantichon et al. 2020, p. 780.
[199] Bartholomew 1989, pp. 191-92.
[200] Fujinami and Matsuhira 1921, p. 1.
[201] Sato 1923, p. 90; Fujinami and Matsuhira 1921, p. 4.
[202] Fujinami and Matsuhira, p. 4.
[203] Tsurumi et al. 1919, p.1953.
[204] Onodera 1919, p. 631.

Some scholars had the opportunity to go on an exchange abroad to pursue their studies, which also was an experience that can be considered part of their "space of experience" and which explains why the bacteriological paradigm dominant in Europe also was persistent in Japan. In the Meiji period (1868-1912), many of Japanese students of medicines were encouraged and sponsored by governmental agencies such as the Ministry of Education to study abroad. The purpose of such research stays was the progress of medical sciences in the Japanese empire. However, students sometimes also went to Germany or other European Universities without a scholarship, but with the hope to be more successful in German institutions as they had failed to get into prestigious Japanese medical colleges. It is estimated that between 1866 and 1914, almost 25,000 Japanese students traveled abroad to pursue a study, of whom 1150 were Japanese medical practitioners spending time in Germany.[205] Therefore, it is not surprising that of the 20 the authors who are considered in this research, 13 previously had pursued medicine studies in Europe. Some of them went by themselves, others were sent by the government or by the institutes they worked for, as was the case for Tsurumi Mitsuzō, who was sent by the Minami-Manshū Tetsudō Kabushiki kaisha 南満州鉄道株式会社 (South Manchurian Railway Company). Fuji Teikichi is only known to have studied in "Europe", of the other twelve more details of their study abroad are known, indicating that 10 of the 13 scholars studied at least for a while in Germany. Only Arai Tsuneo and Yamanouchi Tamotsu, who both graduated from Tokyo Imperial University, did not go to Germany, but studied in Switzerland and at the Pasteur Institute in France, respectively. Although many of the scholars also went to Austria, England, and the USA, it becomes clear from these numbers that Germany was the most popular place to study medicine.[206] Also many of the professors at the universities who provided guidance to the authors when writing their articles about epidemic influenza, had experienced a study abroad in Germany.[207]

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[205] Kim 2016, pp. 54-55.

[206] The 13 authors who went on an exchange and the places where they studied are: Matsushita Teiji in Germany (Freiberg, Giessen, Breslau); Nakamura Noboru in Germany, Austria, Hungary, Checho-Slovakia, Switzerland, England, France and the USA; Fuji Teikichi in Europe; Onodera Naosuke in Germany, Austria-Hungary, England, and Switzerland; Sakakami Kōzō in Germany (Berlin: Augusti Hospital), England (London: St. Mary's under guidance of Sir Almroth Wright), France (Paris, Boulogne), USA; Yabe Sennosuke in England (Edinburgh under guidance of A. R. Cushny, London under guidance of A.T. Clark); Tsurumi Mitsuzō in Germany (Bacteriology and Immunity at the Kaiser Wilhelm Institut Berlin), England (London: Cancer research laboratory, Christar Institute); Fujinami Akira in Germany; Utsui Ryūta in Germany (Heidelberg under guidance of Rudolf Gottlieb); Yamanouchi Tamotsu in France (Paris: Pasteur Institute); Arai Tsuneo in Switzerland (Lausanne under guidance of Hermann Beitzke, Bern under guidance of [Emil] Bürgi). Iseki 1926; Hattensha 1930.

[207] From Tokyo Imperial University, Aoyama Tanemichi, Nagayo Matarō and Miura Minnosuke 三浦謹之助 (1864-?) went to Germany for their studies. Others who went were: Kodama Toyojirō 児玉豊

This period from 1868 until 1914 in which lots of Japanese students went to study in Germany, was a period of reformation in the German medical education system. One major change, was the shift on methodological level from more traditional and clinical training to laboratory training and scientific study. In line with this, a paradigmatic shift was taking place from the pathological explanation of diseases based on scientific empiricism of Rudolf Virchow's (1821-1902) cellular pathology,[208] to the era of bacteriology led by Robert Koch (1843-1910) and his germ theory of diseases. Apart from Germany, also in France this shift took place under Louis Pasteur (1822-1895), and in the rest of Europe. In Japan, cellular pathology lived on significantly longer, as it was taught at Tokyo Imperial University. A third change that took place in Germany, was the "medicalization of society", in which medical science became a discourse for legitimizing a wide range of social reforms and activities, in which the concepts of public health and social hygiene played a prominent role. For example, it was from his experiences in Berlin that Nagayo Sensai 長与専斎 (1838 - 1902) came up with the Japanese term *eisei* 衛生 (sanitation or hygiene) as a translation for the German concept of *Gesundheitspflege*.[209] Japanese students took home more than only their medical knowledge upon their return to Japan. Also the style and conceptions of doing research of their teachers abroad influenced the Japanese medical landscape. In this way, Kitasato Shibasaburō founded the Institute of Infectious Diseases in Tokyo, in an attempt to create a similar institute as the Königlich Preußische Insitut für Infektionskrankenheiten where he studied in Berlin under Robert Koch.[210]

4.3.3. Generation

The last dimension of "space of experience" is the one of generation and generationality. The authors were of different ages and therefore can be seen as belonging to different generations. As the concept of Jürgen Reulecke of generation and generationality describes, a generation can be determined statistically as a cohort born in the same period, or it can be determined culturally as a group of people that grew up in the same formative period.[211] Therefore, in this part of the analysis, both

次郎 (1876-?) of Kanazawa Medical College, Kitasato Shibasaburō and Shiga Kiyoshi 志賀潔 (1871-1957) of the Kitasato Institute, and Toda Shōzō 戸田 正三 (1885-?) of Kyoto Imperial University. Iseki 1926; Hattensha 1930; Jinji kōshinjo 1928.

[208] Cellular pathology sees diseases as the outcome of a disturbance in cellular organization, of which the causality was sought in multiple factors, such as miasma, not solely in a single germ, as bacteriology argued. Kim 2016, p. 127.

[209] Kim 2016, pp. 71-72, 128. Weindling 1986, p. 277.

[210] Kim 2016, p. 125.

[211] Reulecke 2008, pp. 119-121.

the years of birth and possibly formative events will be considered. Another aspect of generation that will be explained, is the passing on of knowledge and values from one generation to the other.

For the purpose of discerning the different generations to which the 20 authors belonged, an analysis was made of their years of birth, years of graduation, and the years of receiving the doctoral title. Based on these data, they were divided into different cohorts, which are of course artificial, and therefore the lines between different groups should not be seen as definite, but as a suggestion, in order to find out whether generation had influence on how people perceived of the circumstances in 1918-1920. Although cohorts usually are based on years of birth, in the case of these academic experts, it was judged that groups of people who graduated or obtained their doctoral degree around the same time, could be seen as a cohort, sharing the same experiences during their studies. As a result, not one, but three ways of defining generation cohorts were explored, as can be seen in Table 2.

Table 2 Cohorts based on years of birth, years of graduation, years of obtaining doctoral degree for all 20 authors of whom biographical data was available. Listed chronologically. Based on data of the Who's who in "hakushi" in Great Japan, Iseki 1926; Hattensha 1930.

Cohorts of Year of Birth	Author	Year of birth	Cohorts of Graduation	Author	Year of graduation	University of graduation	Cohorts of doctoral degree	Author	Year of doctoral degree	University of doctoral degree
1865-1869	Tanaka Tatsusaburō	1866	**1891-1895**	Matsushita Teiji	1894	Fifth High School	**1901-1905**	Fujinami Akira	1901	Tokyo
1870-1874	Fujinami Akira	1871		Fujinami Akira	1895	Tokyo		Matsushita Teiji	1902/1903	Halle/Tokyo
	Sakakami Kozo	1872		Sakakami Kōzō	1895	Saisei Gakusha	**1911-1915**	Miyashita Sōsuke	1912	Tokyo
1875-1879	Matsushita Teiji	1875		Tanaka Tatsusaburō	1895	Saisei Gakusha		Yamanouchi Tamotsu	1913	Tokyo
	Utsui Ryūta	1877	**1901-1905**	Nakamura Noboru	1901	Kyoto	**1916-1920**	Arai Tsuneo	1916	Tokyo
	Sasaki Hideichi	1878		Watanabe Yoshimasa	1902	Saisei Gakusha		Nakamura Noboru	1917	Kyoto
1880-1884	Yamanouchi Tamotsu	1880		Sasaki Hideichi	1903	Tokyo		Sasaki Hideichi	1917	Tokyo
	Nakamura Noboru	1880		Utsui Ryūta	1904	Tokyo		Utsui Ryūta	1918	Tokyo
	Tsurumi Mitsuzō	1880		Yamanouchi Tamotsu	1905	Tokyo		Tsurumi Mitsuzō	1918	Tokyo
	Miyashita Sōsuke	1882		Tsurumi Mitsuzō	1905	Tokyo		Onodera Naosuke	1919	Kyushu
	Watanabe Yoshimasa	1882	**1906-1910**	Miyashita Sōsuke	1906	Tokyo	**1921-1925**	Satō Kiyoshi	1921	Tokyo
	Arai Tsuneo	1883		Satō Kiyoshi	1907	Chiba		Yabe Sennosuke	1921	Kyoto
	Onodera Naosuke	1883		Onodera Naosuke	1908	Kyoto		Sakakami Kōzō	1923	Kyoto
	Satō Kiyoshi	1883		Arai Tsuneo	1908	Tokyo		Watanabe Yoshimasa	1923	Keio
	Yoshizawa Koreo	1884	**1911-1915**	Yoshizawa Koreo	1912	Tokyo		Fuji Teikichi	1923	Kyoto
1885-1889	Yabe Sennosuke	1886		Yabe Sennosuke	1912	Tokyo		Yoshizawa Koreo	1924	Tokyo
	Tanaka Kichizaemon	1886		Tanaka Kichizaemon	1913	Kanazawa		Tanaka Tatsusaburō	1925	Tokyo
1890-1895	Fuji Teikichi	1890		Shimizu Ryō	1914	Kanazawa		Shimizu Ryō	1925	Hokkaido
	Shimizu Ryō	1890	**1916-1920**	Koyama Ryō	1916	Niigata	**1926-1930**	Tanaka Kichizaemon	1926	Kyushu
	Koyama Ryō	1891		Fuji Teikichi	1917	Kyoto		Koyama Ryō	1927	Keio

Looking at the birth years, the oldest author, Tanaka Tatsusaburō, was born in 1866, and the youngest author, Koyama Ryō was born in 1891. In other words, a difference of 25 years existed between the oldest and youngest author. For the purpose of establishing different generations, an artificial construction of cohorts per 5 years was made. Looking at the cohorts constructed in this way, the cohort of 1880-1884 is represented in largest numbers, as 9 out of 20 authors belong to this group. Six authors were older, as they were born between 1866 and 1878 and five authors were younger, born between 1886 and 1891. In the first place, this might be more telling about the general age at which it was common to publish an article in an academic journal around the year 1920, which would be when authors were in their late thirties. On the other hand, Tanaka Tatsusaburō was 52 years old when he published his article and Koyama was 27, meaning that they published at quite different phases of their career.

Another aspect that can be studied based on the years of birth, is the formative era in which the authors grew up, which possibly defined them as a generation. Rather than to consider the various events in the different time frames in which the authors grew up, one can also think of important events and see which authors experienced these events in their youth. Specifically looking at experiences with infectious diseases, the past influenza epidemic of 1889-1890 was probably the most important one in the context of the similar pandemic of 1918-1920. Many of the authors referred to the previous pandemic in their articles.[212] However, looking at the period in which the authors grew up, they did not all experience the pandemic of 1889-1890 in the same way. The first three cohorts of in total six authors (Tanaka Tatsusaburō, Fujinami Akira, Sakakami Kōzō, Matsushita Teiji, Utsui Ryūta, and Sasaki Hideichi) were between 11 and 23 years old when the 1889-1890 pandemic struck and would have actively experienced it, as teenagers and young adults. The other authors were either still too young to understand the severeness of such an event (between 9 and 3 years old), or were not even born (Shimizu Ryō, Fuji Teikichi, and Koyama Ryō). Arguably, having experienced the epidemic of 1889-1890, might have left a different impression than only having heard about it during studies or from family members.

From the years of graduation, it becomes clear that all scholars were graduates before they wrote their articles, although some co-authors for whom biographical data was not available, might have graduated only later. Additionally, a close look at the years in which the authors graduated brings to light that none of them had graduated when the previous pandemic occurred in 1889-1890. Considering this, not one of the

[212] Ōkawara et al. 1918, p. 335; Onodera 1919, p. 634 ; Miyashita 1919, p. 1387 ; Shimizu et al. 1919, 364 ; Satō 1920a, p. 227.

authors could as a graduate have written an article about the previous pandemic. However, the older generation that graduated in the period of 1891-1895, might have studied the epidemic influenza of 1889-1890 as a student, and might have had firsthand experience with research on cases of the epidemic influenza. While the pandemic of 1889-1890 was probably part of the education of internists, bacteriologists and epidemiologists, most of the authors graduated well after that pandemic had subdued, and therefore most likely did not have the chance to study patients of epidemic influenza before the pandemic of 1918-1920.

The combination of the information about the university and year of graduation, provides information about who of the authors were peers during their education. Sakakami Kōzō and Tanaka Tatsusaburō, for example, both graduated from the Saisei Gakusha school in 1895. However, Tanaka became part the Kitasato Institute of Infectious Diseases, while Sakakami entered the National Institute of Infectious Diseases which from 1914 onwards was part of Tokyo Imperial University. At the time of the 1918-920 pandemic, Tanaka was still at the Kitasato institute and Sakakami had established his own medical practice while also being involved in the production of vaccines in the Hoshi seiyaku kaisha 星製薬会社 (Hoshi pharmaceutical company). Despite their different occupations, they might have known each other during their studies and had a very similar academic background. In a similar way, Yabe Sennosuke and Yoshizawa Koreo both graduated from Tokyo Imperial University in 1912, but went separate ways afterwards. Yoshizawa stayed at the institution, while Yabe became part of the private institute of Kitasato. Similarly, Tsurumi Mitsuzō and Yamanouchi Tamotsu graduated both from Tokyo Imperial University in 1905. Afterwards, Yamanouchi went to study in France, while Tsurumi entered the Institute of Infectious Diseases, which was still in hands of Kitasato, and after his study abroad he went to work in the Kwantung Leased Territory. These few examples illustrate that the medical field was divided by the opposition between Kitasato and Tokyo scholars, and that students from the same year and university after their graduation seemingly chose one of the two sides.[213]

Looking at the year in which the authors obtained the title of *igaku hakushi* 医学博士 (doctor of medicine), it becomes clear that although all authors had graduated when the 1918-1920 epidemic influenza struck, many of them had not obtained their doctoral degree yet. Of the twenty articles (considering the continued articles as one article), 9 were written by *igakushi* 医学士(graduates in medicine) , and 11 by doctors

[213] Iseki 1926; Hattensha 1930.

with sometimes graduates as co-authors. Sometimes scholars were assistant professor before they obtained their doctoral degree, and sometimes it was the other way around. 14 out of the 20 authors pursued an academic career after obtaining their doctoral degree, while the other 6 started to work in private hospitals or the army. Regarding the university where the authors obtained their doctoral title, most of them (11 out of 20) received their title at Tokyo Imperial University. Two Kitasato fellows got their title at Keio University, which makes sense because Kitasato was the dean of the medical school there since 1916.[214] The two authors who were at the time of the influenza pandemic of 1918-1920 part of Kyushu University got their title there, Shimizu was the only one to get his title at Hokkaido University, and the remaining 4 authors obtained their title at Kyoto Imperial University.

The last aspect of generation to consider, is the passing on of knowledge from one generation to the other. As indicated above, 9 of the 20 articles were written by graduates, and in their articles they often mentioned the guidance of a specific person at their institution. The persons who provided guidance were often from an older generation, and for this generation as well, a short analysis of their years of birth, years of graduation and places of exchange will be discussed, as can be seen in Table 3.

Table 3 Leaders of the institutions and the professors who provided guidance to authors of academic articles about the epidemic influenza of 1918-1920, their years of birth, years of graduation, and the places where they went on exchange

Leader institution/ provider of guidance	Institution	Year of birth	Year of graduation	Place of exchange
Kitasato Shibasaburō	Kitasato Institute	1856	1883	Germany (Robert Koch)
Aoyama Tanemichi	Tokyo Imperial University	1859	1882	Germany
Miura Minnosuke	Tokyo Imperial University	1864	1887	Germany (Robert Koch and HansVirchow) Heidelberg, Marburg, Paris
Kitajima Taichi	Kitasato Institute	1870	1895	/
Shiga Kiyoshi	Kitasato Institute	1871	1896	Germany
Miyajima Mikinosuke	Kitasato Institute	1872	1898	USA
Kodama Toyojirō	Kanazawa Medical College	1876	1894	Germany (Dresden, Strassburg)
Nagayo Matarō	Tokyo Imperial University	1878	1904	Germany
Toda Shōzō	Kyoto Imperial University	1885	1910	England, France, Germany

Considering the years of birth, some overlap exists between the younger professors who provided guidance and the older authors who published the articles. Fujinami

[214] Liu 2008, p. 53.

Akira who wrote an article about the epidemic influenza, for example, was born in the same year as Shiga Kiyoshi 志賀潔 (1871-?), who provided guidance to a group of graduate students who wrote an article on 1918-1920 pandemic at the Kitasato Institute.[215] However, the founders and prominent professors at institutions such as Aoyama Tanemichi and Kitasato Shibasaburō were from a different generation, which had graduated already for quite some time before the pandemic of 1889-1890 occurred.

All but one of the professors who provided guidance to the authors went abroad to study, with Germany as a popular destination. Looking at the combined data of the professors at the institutions and the twenty authors, it is remarkable that the scholars who obtained their doctoral title only after 1920, often did not study abroad while before that it seemed to be the norm. This could be either because it became less popular to study abroad around that time, or it could be a consequence of the First World War, during which study in Europe, especially Germany, would have been impossible. It could also be that the scholars went abroad later in their career, and that therefore this information was not included in the *Who's who in "hakushi" in Great Japan,* which only includes data until 1926 or 1930, depending on the volume.[216] The authors who had not studied abroad at the time of the writing of their article on the epidemic influenza of 1918-1920, were often graduate students, and almost all received guidance of a more experienced scholar, who had been abroad. The scholars Tanaka Tatsusaburō, Watanabe Yoshimasa and Koyama Ryō of the Kitasato Institute, who wrote an article on the causative agent of epidemic influenza, were all still graduates without experience abroad. They received guidance of Kitajima Taichi and Shiga Kiyoshi, who were both experienced researchers of the Kitasato Institute.[217] At Kyushu Imperial University, Tanaka Kichizaemon wrote an article on the influence of the weather on influenza, which would also be the topic of his doctoral thesis. Tanaka did not study abroad, but wrote this article under guidance of Onodera Naosuke who was only 3 years older, but had obtained his doctoral degree 7 years before and had studied abroad.[218] Shimizu Ryō was a graduate student of medicine at Kanazawa Medical College without research experience in Europe. For his article on epidemic influenza, he and his colleagues received guidance of Kodama Toyojirō who had been a professor at the medical college for two years and who had studied in Germany.[219] At Kyoto Imperial University, Fuji Teikichi, who only in 1925 went on an exchange

[215] Ōkawara et al 1919, p. 40.
[216] Iseki 1926; Hattensha 1930.
[217] Ōkawara et al 1919, p. 40.
[218] Tanaka 1926, p. 245.
[219] Shimizu et al. 1919, p. 390.

to Europe, received guidance for his article in 1920 from Toda Shōzō, who had pursued his medical study abroad and had received his doctoral title two years before.[220] Lastly, only one of the authors who had obtained his doctoral degree already when writing his article, Satō Kiyoshi, did not study abroad. He was also the only person with a doctoral title to receive guidance for his article. He received this guidance from Nagayo Matarō, who was one of the central persons in the Institute of Infectious Diseases after 1914.[221] In this way, it seems that the research experience abroad was esteemed highly and that it was made sure that the knowledge that was gathered abroad was passed on to the younger generation, which had studied only in Japan. However, knowledge and values that are passed down to a younger generation are not always accepted as such, but sometimes also can be re-interpreted or rejected.[222]

4.3.4. Conclusions regarding the "Spaces of Experience"

The analysis of the "Space of experience" brought to light that the authors shared a communicative memory in which the medical field had to come with solutions for many infectious diseases, which often were found within the field of bacteriology. Additionally, it became clear that this shift towards bacteriology in medical research also took place in Europe, where almost all authors had studied. If authors themselves did not study abroad, they received guidance from a more experienced scholar who had been abroad. As a result, all scholars shared a direct or indirect influence from international medicine to which they were also connected via the medical journal, and were part of a paradigm of bacteriology.

Possible differences in the "spaces of experience" were dependent on the institution where the authors studied and the generation to which they belonged. As the medical field was split into a group of private institutions centering around Kitasato Shibasaburō and another group of imperial universities centering around Tokyo Imperial University, it is not unlikely that the institution to which an author belonged influenced the way they perceived the origin of the epidemic influenza. The generation to which the authors belonged determined whether they had firsthand memories of the previous pandemic of 1889-1890, whether they had firsthand experience studying abroad and possibly whether they experienced the shift from cellular pathology to bacteriology. Fujinami Akira, for example, studied the epidemic influenza from the perspective of anatomical pathology, because this was the field in which he had more experience. On the other hand, younger scholars such as Shimizu Ryō, who was part

[220] Fuji 1920a, p. 667.
[221] Sato 1923, p. 90; Iseki 1926; Hattensha 1930.
[222] Reulecke 2008, p. 123.

from the bacteriological department of the Kanazawa Medical College, studied the disease from a bacteriological perspective.[223] According to Koselleck's concept, the experience of change in the form of rapid new developments and new discoveries, as a phenomenon typical to modernity, could break up the "space of experience" within a generation, shaking all expectations for the future and opening a new and broader "horizon of expectation" in which progress was expected.[224] In the line of this theory, it could be that the generation which had experienced a paradigmatic shift from pathology to bacteriology was more open to the possibility that the epidemic influenza could not be explained by current theory, but that future developments would be able to establish the cause of the disease. In this case, that generation would probably be the younger generation that had accepted the new paradigm of experimental bacteriology as a new way of doing research.

4.4. Methodology of Discourse Analysis

After considering the experiences of the authors in the last chapter, this chapter will focus on the academic articles they published in medical magazines. First, a short overview of the theory of discourse analysis employed here will be given. In the following section, the methodology will be utilized to analyze the primary sources.

For this thesis the approach to discourse analysis developed by linguist Norman Fairclough and adapted by historian Marnix Beyen will be followed. Although Fairclough focused more on the social aspect and on how to improve for the future, Beyen has argued that Fairclough's practical and systemic approach is a valuable methodology for historians as it allows to get a better understanding of the complex relation between language and social change.[225] Fairclough used the term 'discourse', to imply that language usage is a form of social practice, rather than a purely individual activity as it was described in the tradition started by the linguist Ferdinand de Saussure (1857-1913). As a consequence, Fairclough saw discourse as a mode of action, as well as a form of representation. Discourse at the same time represents the world but also signifies, constitutes, and constructs the world in meaning. Therefore, the relation between discourse and social structure is dialectical, meaning that discourse is neither a mere reflection of a deeper social reality, nor the direct source of social practice.[226]

In the study of a text, Fairclough discerned three levels. The narrowest level is that of the individual text, which conveys a meaning through words and sentences. This

[223] Fujinami and Matsuhara 1921, p. 1, Shimizu et al. 1919, p. 630.
[224] Koselleck 1979, p. 264.
[225] Fairclough 2013, pp. 10-11; Beyen 2019, p. 38.
[226] Fairclough 1998, pp. 62-65.

individual text itself is part from the broader level of discursive practice. This practice is the economic and societal context of the text and is concerned with the process in which a text was produced, distributed, and consumed as part of society. Discursive practices are embedded in the last and broadest level, namely the social practice or context. This is the whole of the circumstances in which a text is compiled. It includes biographical information about the author of a text, and the political and economic circumstances in which it was written. This last level is important to consider alongside the discourse analysis but is not part of the analysis itself. In this thesis, the social practice is considered partly in the chapter on the experience of the 1918-1920 epidemic influenza in Japan, and partly in the analysis of the "spaces of experience" of the authors, which encompasses their biographies and education. The two other levels, those of the discursive practice and the individual text, are subdivided and analyzed in respectively three and four steps. The first three steps are part of the discursive practice, and comprise the genre and statute, the relation between author and audience, and the intertextuality and interdiscursivity of a text. The following four steps are part of the level of the individual text and start with the smallest part of a text, the word, and then gradually go from the sentence to the paragraph, finally reaching the level of the whole of the text.[227]

Following these seven steps, the primary sources will be analyzed to find elements that can indicate whether they are part of a certain discourse. During this process, it is important to remember that a discourse analysis can only give a hypothesis of what an author meant, and to refrain from jumping to conclusions. Moreover, it should not be assumed that people are aware of the ideological dimensions of their own practice, as ideologies can be built into conventions and can be naturalized and automized to authors. Lastly, it can be said that the seven steps form a tool for a successful, deeper reading of a historical text, but are no strict scheme that should be followed at all times. The line between what is part of discursive practice and the individual text is not sharply defined, so sometimes overlap between steps may exist. In the analysis of the 24 primary sources, some steps proved more important and those will be considered in more detail than others.[228]

4.5. Analysis of Primary Sources through Discourse Analysis

Discourse analysis starts at the level of the discursive practice and analyzes the genre and statute of a text as they might be associated with specific characteristics, such as

[227] Beyen 2019, pp. 38-39; Fairclough 1998, pp. 73-74.
[228] Beyen 2019, p. 39; Fairclough 1998, p. 90.

the usage of certain vocabulary or sentence structures.[229] As was explained in a previous chapter that introduced the primary material, all articles were published in specialized medical journals, except for one.[230] The journals in which the articles were published, were of various backgrounds, either published in Japan or abroad and either specialized in one medical field such as otorhinolaryngology, or including articles from various fields, as the the *Igaku chūō zasshi* 医学中央雑誌 (Medical central magazine) did. Although certain genre characteristics might differ depending on the specific journal, all articles in general share the same academic genre. Although some articles are longer than others, they almost all follow the conventional format of a scientific article, with a clear introduction, corpus, and conclusion. Because the focus of this research lies on the way the scholars perceived the epidemic influenza and not on their specific scientific methods, the discourse analysis will focus mostly on the introduction and conclusion of the texts. The statute is therefore the same for all sources: the initial and last pages of academic articles in medical journals. Introductions and conclusions are especially interesting for a discourse analysis, because they generally have a broader reach than the corpus of a text, and because authors tend to give a synthesis of their point of view on matters in these parts of their text.[231]

In the following, the articles will be divided and discussed in four groups based on their main argument regarding the origin of the influenza pandemic. As among the 24 articles, some are continuations of the same article in the next number of the journal, in total 20 separate titles can be discerned which will be divided in different groups.[232] As has been discussed before, it did not become clear what was causing the epidemic influenza until in the 1930s, when viruses were discovered. At the time of the "Spanish flu", the dominant theory was that all infectious diseases were caused by bacteria. However, as bacteriological and pathological experiments failed to provide hard evidence for one specific bacteriological causing agent, the opinions were divided and scholars started to look for other possible causes of the disease.[233] In the articles published in Japanese medical journals, four main points of view could be discerned. The first point of view stated that Pfeiffer's bacillus, also known at the time as *bacillus*

[229] Beyen 2019, pp. 41-46.
[230] One source is a chapter of a book instead of an academic article: Matsushita 1920.
[231] Beyen 2019, p. 43.
[232] Fuji 1920a, Fuji 1920b, and Fuji 1920c are continuations of the same article; similarly Utsui 1920a and Utsui 1920b are together a continued article; Satō 1920a and Satō 1920b, are two short articles on consecutive pages of a journal. Although with separate titles, they both concern secondary complications of influenza, and are considered as one article in this thesis. An overview of the 20 articles can be found in the appendix p. 83.
[233] Fukumi 1985, p. 112.

influenzae, was without doubt the cause of the epidemic influenza. The second position in the debate on the other hand, argued that the cause could not be Pfeiffer's bacillus, but was an unknown origin. A third group in the debate accepted that there would not be an agreement on the cause of the disease in the near future, but instead focused on the complications or ways of prevention. This last group can be divided further into two groups of which the first saw Pfeiffer's bacillus as a possible causative agent without going into much detail, and the second group did not choose one or the other side in the discussion. In the following part, the articles of these four groups will be analyzed for elements that they used to build the discourse supporting their point of view.

4.5.1. Pfeiffer's Bacillus as Cause

Some scholars were convinced that the only possible cause of the epidemic influenza was Pfeiffer's bacillus. They based this argument on the scientific knowledge gathered from the previous pandemic of 1889-1890 of which the cause had been discovered in 1892 by Richard Pfeiffer (1858-1945).[234] From the selection of sources studied in this paper, six articles support this theory. Of these six sources, four were written by scholars of the Kitasato Institute, one by a researcher of Kyōto Imperial University, and one by a group of scholars active at the Kantō totokufu Dairen ryōbyōin 関東都督府大連寮病院 (Office of the Governor-General of Kwantung Hospital at Dalian). Three of these articles were concerned especially with the origin of epidemic influenza, describing experiments and experiences both in Japan's main islands and the Kwangtung leased territory.[235] Two articles focused on the usage of vaccines based on Pfeiffer's bacillus, reporting on experiments on animals and on leucopenia observed in humans after inoculation.[236] Lastly, one source gave a general overview of the disease and how it spread, for example, in public transport.[237]

These texts share all the same genre and statute, being academic introductions and conclusions of academic articles, except for one. This exception is a chapter of a book called *Eisei Hyakuwa* 衛生百話 (Hundred stories about hygiene), which is a compilation of short stories that had been published in newspapers before. This source of a different genre is interesting to contrast against the other sources, as it brings to light the difference between academic works and popular science. Where other sources were more descriptive and built on data to ground their arguments, microbiologist and

[234] Eyler 2010, pp. 27-29.
[235] Ōkawara et al. 1918; Ōkawara et al. 1919 ; Tsurumi et al. 1919.
[236] Umeno et al. 1919; Yabe 1922.
[237] Matsushita 1920, p. 36.

bacteriologist Matsushita Teiji 松下禎二 (1875-1932) stated without argumentation that Pfeiffer's bacillus was the cause of the disease, and was rather performative[238] when recommending people should avoid influenza by washing their hands.[239]

The aspect of the relation between author and audience proves to be telling of what authors of the articles expected the generally accepted point of view to be. It is remarkable how bluntly some statements were made, and on the other hand how extensively arguments were built in other cases. For example, comparing the two articles by Ōkawara Ichitarō 大河原一太郎 [240] and his colleagues, differences with regards to expectations of norms and knowledge of the reader audience can be seen. Ōkawara and his team first published an article in English in the *Kitasato Archives of Experimental Medicine* journal and afterwards they published a similar article in Japanese in the *Saikingaku zasshi* 細菌学雑誌 (Bacteriological journal). In the English article, they explained their reasoning and argued extensively why the cause had to be the Pfeiffer's bacillus, which might indicate that they expected their audience not to share their opinion. In the Japanese article on the other hand, they stated as a matter of fact that the epidemic was caused by Pfeiffer's bacillus, indicating that they expected it to be the common understanding.[241] In a similar way, Umeno Shinkichi 梅野信吉 (1863-1930) and his team stated that their colleagues at the Kitasato Institute had proven the cause to be the *influenzae bacillus*, and did not go into further detail.[242] On the other hand, other authors did provide arguments to prove their point. Internist Yabe Sennosuke 専之助矢部 (1886-?) based his view of the *influenzae bacillus* as the causing agent in influenza on the fact that when it was injected into laboratory animals, it caused leucopenia similar to cases of natural influenza infections in humans.[243] Internist and bacteriologist Tsurumi Mitsuzō 鶴見三三 (1880-1951) and his team of graduate students published an article in the *Igaku chūō zasshi*, introducing the discussion about the cause of the disease as common knowledge, and then taking their stance. They explained in great detail based upon which facets of their research they could draw conclusions and which parts did not lead to results. Finally, they concluded that Pfeiffer's bacillus was the cause, and that infection weakened the body for

[238] Performative language is a term for language that is used with the objective of influencing the reality in which it functions. This can take the form of a command, prohibition, or rhetorical question, either bringing a general message, or directly adressing the reader. The performativity of a text exists always within the social and discursive context in which it was created, bringing about interaction between the author, readers and mediators such as translators and publishers, Beyen 2019, pp. 44-46, 49.
[239] Matsushita 1920, pp. 35-37.
[240] Life dates unknown.
[241] Ōkawara et al. 1918, p. 342; Ōkawara et al. 1919, p. 38.
[242] Umeno et al. 1919, p. 151.
[243] Yabe 1922, p. 67.

secondary infections with other bacteria, leading to pneumonia.[244] Apart from these different expectations regarding the opinion of the public about the origin of the influenza epidemic, all five academic articles have in common that they did not explain medical terms, and that they often expected the reader to be familiar with the previous epidemic of 1889-1890.[245] The chapter of the book with stories on hygiene written by Matsushita on the contrary, was directed clearly at a broader public. Signs for this are the usage of *furigana*[246], written next to every Japanese character, which made it easier to read, and the usage of anecdotes and puns to keep the attention of the audience.[247]

Regarding intertextuality and interdiscursivity, the usage of certain terms that fit more into war related texts than in a medical journal, is remarkable. Ōkawara described the spread of the influenza with verbs expressing aggression, or the movement of an army, such as *okasu* 侵す(to invade), *osōu* 襲う(to attack), and *shingai wo kōmuru* 侵害を蒙る (to suffer an invasion). Moreover, he used exact numbers to describe the circumstances in Europe, but stated that in the South-African Cape region the cases were accumulating so fast that it was not necessary to measure the pandemic in numbers as corpses were assembling into mountains.[248] This last sentence could be seen as a *topos* contrasting developed Europe to undeveloped Africa.

Turning to the textual analysis, first the level of the word will be addressed. A first interesting aspect of vocabulary usage is the way authors referred to the epidemic influenza. All six texts used the general term *ryūkōsei kanbō* 流行性感冒 (epidemic influenza) in their title. However, Matsushita mentioned the disease originally was called the *Oranda kazehiki* ヲランダカゼヒキ (Holland's cold), referring to a foreign origin, and Tsurumi at a certain point referred to the pandemic with *Akusei kanbō* 悪性感冒 (malignant flu), giving it a normative connotation.[249] In discourse analysis, adjectives are seen as normative and performative instances as they reduce a complex reality to merely one of its attributes.[250] The performativity of adjectives in case of these articles is mostly the presentation of the epidemic influenza as something that should be feared. The influenza pandemic was described as 'raging furiously',[251] and as having a *hanahada ōkii densenryoku* 甚だ大きい伝染力 (very strong power of

[244] Tsurumi et al. 1919, p. 1652.
[245] Tsurumi et al. 1919, p. 1652-53; Ōkawara et al. 1919, p. 13; Ōkawara et al. 1918, p. 335.
[246] These signs are written next to characters and function as a reading aid, indicating the pronunciation.
[247] Matsushita 1920, p. 36.
[248]死体積んで山をなす, Ōkawara et al. 1919, p. 13.
[249] Matsushita 1920, p. 35; Tsurumi et al. 1919, p. 1653.
[250] Beyen 2019, pp. 88-89.
[251] Umeno et al. 1919, p. 151.

contagion),[252] with a spread that was both *jinsoku* 迅速 and *mōretsu* 猛烈 (rapid and fierce), [253] a 'striking morbidity', and an 'enormous rapidity', affecting the 'entire population'. [254] In the usage of pronouns, the two articles by Ōkawara and his colleagues showed signs of making a distinction between two groups, being one group that believed like them that Pfeiffer was the cause, and another group that believed diplococcus to be the cause. In this way Ōkawara and the co-authors distanced themselves from 'some' who were of the opinion that diplococcus was the causative agent of epidemic influenza, a point of view which Ōkawara and his colleagues dismissed as being 'irrational' compared to their own experimental results. [255] Moreover, in their Japanese article, Ōkawara and colleagues described how they themselves were able to confirm the Pfeiffer's bacillus, but that it was hard and that 'some people' might not have the right materials to find the same results. So indirectly they suggested that scholars who did not find the same results were not capable, or that their institutions lacked the appropriate equipment.[256]

On the level of the sentence, performativity can be expressed by usage of rhetorical questions or sentences with a double negation.[257] Examples of both can be found in these texts. Matsushita used a rhetorical question building suspense in his explanation of how a small bacterium can cause an epidemic, however this did not function *per se* as performative action, as he answered the question soon afterwards, not asking an action of the public.[258] Ōkawara and his colleagues used the construction of double negation to describe the severeness of the spread of the disease stating: the epidemic "does not stop if it has not attacked the largest part of the whole population".[259]

Regarding the level of the paragraph, the listing of sentences without explicit causality in order to support an argument can be observed.[260] Matsushita listed in the end several complications that could follow after infection with influenza, supporting the argument that it was a dangerous disease.[261] Ōkawara and colleagues listed in both texts other researchers with similar conclusions, in order to strengthen their position in the debate.[262]

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[252] Matsushita 1920, p. 35.
[253] Tsurumi et al. 1919, p. 1627.
[254] Ōkawara et al. 1918, p. 335.
[255] Ibid., p. 342.
[256] Ōkawara et al. 1919, p. 39.
[257] Beyen 2019, pp. 96-98.
[258] Matsushita 1920, p. 36.
[259]全住民の大半を襲わずんば止まざる, Ōkawara et al. 1918, p. 13.
[260] Beyen 2019, pp. 99-100
[261] Matsushita 1920, p. 37.
[262] Ōkawara et al. 1918, p. 343; Ōkawara et al. 1919, p. 40.

The structure of the whole of the texts can be described to be a combination of descriptive parts, where the results of experiments were explained, and more normative and performative parts. Ōkawara and his colleagues, for example, started their article with a normative part, depicting the epidemic influenza as an enormous threat, and concluded with a more descriptive conclusion in which they presented their results matter-of-factly.[263] Matsushita on the other hand started his text in a more descriptive way and ended with the performative message asking his audience to make sure they do not catch a cold, by means of washing their hands frequently.[264]

4.5.2. "Filter-passing" Agent

Opposite to the former view regarding the cause of epidemic influenza, some scholars were convinced that Pfeiffer's bacillus could under no circumstances be the infecting agent. Moreover, they thought that not one of the other already known bacteria such as pneumococci or diplococci could be the cause of influenza. Among the sources discussed here, one article, written by the internist Yamanouchi Tamotsu 山内保 (1880-?) and his colleagues, supports this point of view.[265] They were scholars who had studied at Tokyo Imperial University, but at the time of this article Yamanouchi had his own medical practice in Paris and Sakakami Kōzō 坂上弘蔵 (1872-?) was director of vaccine manufacturing in the bacteriological department of the Hoshi pharmaceutical company in Tokyo.[266] This means that they both had some independence from university structures which might have given them an advantage in that they could also take a distance from the path dependencies that often developed in institutions with a strong internal hierarchy and coherence. This could possibly have made it easier for them to imagine a paradigm shift than if they had been in the relatively rigid structures of academic institutions.

They published their findings in English in an article in the *Lancet*. These findings were based on experimental research performed on volunteering doctors and nurses, in which both emulsions and filtrates of sputum of influenza patients were injected into nose and throat of healthy persons, in order to find out whether they would get sick. The article itself is quite short, and is mostly descriptive, with at the end a summary in bullet points based directly on the results of their experiments, without much of arguing. The most important discovery was stated first in the summary: "1.

[263] Ōkawara et al. 1919, pp. 13, 38-39.
[264] Matsushita 1920, pp. 35-37.
[265] Yamanouchi et al. 1919.
[266] Biographical data on the third author, Iwashima S., could not be found. Iseki 1926, p. 173; Hattensha 1930, p. 734.

the germ of influenza cannot be removed by filtering (filterable virus)".[267] By utilizing a Berkefeld filter, which was a bacterial filter, the authors could confirm that whatever pathogen was causing the disease, it had to be smaller than all the bacteria known at the time. This kind of research into "filter-passing" agents started in the 1880s trying to disprove Pfeiffer's argument about the *bacillus influenzae,* and was the beginning of virology. Yamanouchi and his colleagues were worldwide among the firsts to confirm a "filter-passing" agent as the cause of epidemic influenza.[268] The performative part in the introduction of the article shows that they were certain their technique was effective: "we have been able to solve some important questions related to this infectious disease".[269] With this statement, they left no doubt about the accuracy of their results and they wanted at the same time to influence reality by publishing this message, trying to convince other scholars of their point of view.

4.5.3. No Agreement on the Cause, Possibly Pfeiffer's Bacillus

The formerly discussed articles representing the two opposite points of view regarding the cause of epidemic influenza, were a minority. The majority of the articles were largely undecided on what explanation of the origin of the epidemic to accept. These articles mentioned the ongoing debate regarding the cause of the epidemic, but often left this problem aside to focus on complications associated with epidemic influenza, not per se directly related to the infecting agent. This part will discuss five of these articles, which mentioned Pfeiffer' bacillus as the probable cause, although not focusing on the cause of the disease.[270] Two of these articles are written by scholars from Kyūshū Imperial University, and both focus on the underlying circumstances such as the weather, menstruation, or age, which they argued to be contributing causes apart from Pfeiffer's bacillus.[271] From Tokyo Imperial University, two articles are included. They both were concerned with secondary complications rather than the cause of influenza, but they mentioned Pfeiffer's bacillus as a possible cause. Internist Yoshizawa Koreo 吉澤惟雄 (1884-?) and Kubo Kametarō 久保龜太郎[272] investigated the carriers of meningococci and influenza bacilli among USA Red Cross Hospital soldiers and nurses in Vladivostok.[273] Satō Kiyoshi 佐藤清 (1883-?) wrote about jaundice and complications found in the stomach and intestines after infection

[267] Yamanouchi et al. 1919, p. 971.
[268] Taubenberger et al. 2007, pp. 583-85.
[269] Yamanouchi et al. 1919, p. 971.
[270] Onodera 1919 ; Yoshizawa and Kubo 1919 ; Satō 1920: Fujinami and Matsuhira 1921; Tanaka 1926.
[271] Onodera 1919, pp. 629-30. Tanaka 1926, p. 257.
[272] Life dates unknown.
[273] Yoshizawa and Kubo 1919, pp. 47, 57.

with influenza.[274]The last article was written by Kyōto Imperial University scholars Fujinami Akira 藤浪鑑(1870-1934) and Matsuhira Ryōichi 松原良一[275]who wrote their article on findings of an anatomical pathology of epidemic influenza, focusing mostly on pneumonia, but mentioning Pfeiffer's bacillus as a possible cause.[276]

The genre of the five sources is quite similar, as they were all published in academic medical journals. However, the article by internist Onodera Naosuke 小野寺直助 (1883-?) seems to be a written down version of a speech he held at the 16th meeting of the Nihon naika gakkai 日本内科学会 (Japan Society of Internal Medicine), with some characteristics of the genre, such as multiple rhetorical questions at the beginning.[277] Similarly, the article by Fujinami and Matsuhira was published after a presentation on the topic in Spring 1920 at a meeting of the Japan Society of Internal Medicine, and possibly therefore also carried some personal elements that would be found rather in a speech than in an academic article. For example, Fujinami began by explaining how he fell ill in the preparations of the presentation, and how the graduate student in medicine Matsuhira had to do a lot of the work on his own.[278] The remaining three sources had genre characteristics common to academic articles. Of all sources the statute will be the introduction and conclusion, except for the two short articles by Satō, which do not have a separate introduction and conclusion, and which will therefore be considered in their whole.[279]

The relation between author and audience was explicit in the written speech by Onodera. He addressed the public directly, saying that he hoped to receive everyone's sympathetic judgement and support for his observation methods.[280] In this phrase already, he seemed to expect an audience that was somewhat hesitant to agree on his point of view, and this same expectation came to the front when he described his findings about a connection between a decrease in alkali and the onset of epidemic influenza: "of course you could argue it is just an accompanying factor, but I think it is an important relation".[281] To support his unusual view upon related factors to epidemic influenza, he argued that the Pfeiffer's bacillus, if it would be the cause, could only be developed at room temperature, and therefore would not be able to infect

[274] Satō 1920a, p. 37; Satō 1920b, p. 38.
[275] Life dates unknown.
[276] Fujinami and Matsuhira 1921, p. 67.
[277] Onodera 1919, p. 626.
[278] Fujinami and Matsuhira 1921, pp. 1-2.
[279] Satō 1920a, p. 37; Satō 1920b, p. 38.
[280] 私の様な観察方法もあるべきことを開陳して、皆様の同情ある御判断と御助力を乞う次第であります, Onodera 1919, p. 626.
[281] 勿論予備「アルカリ」現象は単に素因増減の事実と随伴した症状であるという議論もありますが、私は其以上に重要な関係があると信じます, Onodera 1919, p. 635.

lots of people in the cold of the winter, if it were not for other factors such as a decrease in alkali, that weakened humans.[282] From this argumentation, it becomes apparent that Onodera expects an audience that is willing to believe that Pfeiffer's bacillus is the causative agent in epidemic influenza, but might not be willing to believe the influence of other factors such as the amount of alkali. Tanaka, who was part of Onodera's research department, built further on the arguments of his teacher. He stated that Onodera was successful in proving that the decline of alkali, caused by cold weather, was an assisting factor in infection with the Pfeiffer's bacillus. On this basis, Tanaka researched the influence of the weather on diseases, although he started off by indicating that he realized that this field did not have a scholarly appearance yet, anticipating a disagreeing audience.[283] All five articles expected an audience of scholars who knew about Pfeiffer's bacillus as a possible cause of epidemic influenza.

Regarding intertextuality, it could be argued that in academic texts the reference to sources or authors on which a text is based also functions, although rather explicitly, as a form of intertextuality. Satō, for example, referred mostly to Western sources, comparing his results to those, indicating a strong influence of Western or international medicine on his work.[284] An example of interdiscursivity is how Onodera used *topoi* of a discourse for equality in a medical context, when he described how the disease invaded all people, disregarding race, class, gender, occupation, and age. The same phrasing also described the disease as *okasu* 侵す(invading) people, which at its turn is a term coming from a war related discourse.[285]

Arriving at the level of the word, all sources referred to the influenza pandemic with the neutral Japanese phrasing *ryūkōsei kanbō* meaning epidemic influenza. However, Onodera at one point also called the disease the *Supein byō* 西班牙病 (Spanish disease). Interestingly, he assumed that this name indicated that the disease had begun in Spain and therefore he thought it was an incorrect term. He believed it impossible for a disease to spread in such a short space of time from one place to the whole world, and accordingly assumed the disease started at several places in the world at the same time.[286]

At the level of the sentence, the written speech by Onodera utilized rhetorical questions which contributed to the performative character of the text. He, for example,

[282] Onodera 1919, p. 633.
[283] Tanaka 1926, p. 245.
[284] Satō 1920a, p. 37
[285] Onodera 1919, p. 626.
[286] Onodera 1919, p. 634.

asked his audience whether it could be possible that human always have the pathogen of influenza inside them, and only get infected when their resistance is weak.[287]

Looking at how sentences form paragraphs, some cases of implied causality can be discerned. Satō, for example, did not explicitly state that he thought Pfeiffer's bacillus to be the causative agent, but implied it in the way he phrased his conclusion. He indicated that for diseases of intestines, often the causing agent could be found in the excretion of patients. In the following sentence, he stated that another scholar had found Pfeiffer's bacilli in the feces of influenza patients with symptoms of intestine catarrh.[288] In this way, he only implied Pfeiffer's bacillus as a cause, not stating clearly that it was to be seen as the true cause. Onodera in a similar way answered his own rhetorical question about the continuous presence of a pathogen in the human body with the statement that a scholar had found a bacillus very resemblant of the Pfeiffer's bacillus in healthy dogs and marmots.[289] By way of this phrasing, he insinuated without explicitly stating it, that the presence of Pfeiffer's bacillus in healthy organisms could mean that people always carry the pathogen of influenza with them, only getting infected by it when their resistance is weakened.

Considering the articles in their whole, the articles of Satō, Tanaka, and Yoshizawa and Kubo were all rather descriptive. Fujinami and Matsuhira wrote a text with a descriptive corpus, but a rather performative introduction and conclusion. They ended by stating in bold that they thought there was a need to cooperate over different fields for the pursuit of the pathogen of the disease.[290] This is performative language, as it addressed other researchers and asked them to perform a certain act, namely that of cooperation. Onodera built his text to support his argument of the importance of decline in alkali as a factor in the onset of influenza epidemics. He started by indicating the importance of contributing factors, then listing conditions such as menstruating, famine, or doing intensive exercise, which were associated both with a decline in alkali and the onset of influenza. After a side remark about how the energy of the sun could also have influence on the outbreaks of epidemics, he then concluded that based on his intuition, there must be a strong relation between alkali and influenza.[291] Possibly also because of the genre, Onodera's speech was quite personal compared to the academic articles.

[287] Onodera 1919, p. 634.
[288] Satō 1920b, p. 38; catarrh is the inflammation of the mucous membranes in cavities of the body.
[289] Onodera 1919, p. 634.
[290] Fujinami and Matsuhira 1921, p. 70.
[291] Onodera 1919, pp. 626-635.

4.5.4. No Agreement on the Cause, Focus on Complications

The remaining eight articles did not prefer one causative agent to the other, but debated the complications of epidemic influenza, which were often the cause of death after one had been infected. The scholars from the Kanazawa igaku senmon gakkō eisei saikingaku kyōshitsu 金澤医学専門学校衛生細菌学教室 (Kanazawa medical College Hygiene and Bacteriological Institute), Shimizu Ryō 清水亮 (1890-?) and his colleagues, did bacteriological research on the epidemic influenza, stating that no one had been able to find sufficient proof of a causative agent.[292] Internist and specialist of diseases of respiratory organs Sasaki Hideichi 佐々木秀一 (1878-?) wrote an adaptation of a lecture he had given at a meeting at the Kyōundō byōin 杏雲堂病院 (Kyōundō hospital), in which he focused on the treatments of epidemic influenza that due to the circumstances were not based upon a fixed theory about the origin of the disease.[293] Similarly, the internist Utsui Ryūta 碓居龍太 (1877-?) gave an overview of the chaos of possible treatments, which was caused by the disagreement on the cause of the epidemic influenza.[294] Satō Kiyoshi 佐藤清 (1883-?), who has been mentioned before for his other articles, in 1923 published an article on the occurrence of pneumonia, as he believed this not to be a mere secondary complication, but a result of the advancing of the pathogen of influenza in the lungs.[295] Hygienist Fuji Teikichi 富士貞吉 (1890-?) from Kyōtō Imperial University, did surveys in the prisons in Japan in order to find out how, regardless of the nature of the pathogen, the epidemic influenza spread through a population.[296] The other three sources focused on specific secondary symptoms occurring simultaneously with influenza, as they had observed in their field. Ophthalmologist Miyashita Sōsuke 宮下左右輔 (1882-?) described symptoms of eye diseases within influenza patients.[297] Internist Arai Tsuneo 荒井恒雄 (1883-1971) described cases of peroneal nerve paralysis and debated whether they could be caused by epidemic influenza.[298] Otorhinolaryngologist Nakamura Noboru 中村登 (1880-?) wrote about a survey on symptoms of complications related to his field of expertise, but could only report unsatisfactory results as the last epidemic of influenza had subdued when he wrote his article in 1921.[299]

[292] Shimizu et al. 1919, p. 364.
[293] Sasaki 1920, p. 1445.
[294] Utsui 1920b, p. 657.
[295] Satō 1923, p. 138.
[296] Fuji 1920a, p. 667.
[297] Miyashita 1919, p. 1387.
[298] Arai 1918, p. 611. Peroneal nerve paralysis is a paralysis of the lower limbs.
[299] Nakamura 1921, p. 337.

All eight articles were published in academic journals and for all of them the introduction and conclusion were considered, meaning that they share a same genre and statute. However, Miyashita's article and Sasaki's article, both published in the *Igaku chūō zasshi* were a bit shorter and did not have a clearly separated introduction and conclusion. As is characteristic for the genre, most articles took a generally descriptive tone. However, some performative formulations can be found in introductions, such as the parts where authors state that they "hope to help solve this problem"[300], or that they believed they should mention certain symptoms for the time when the influenza returned.[301]

The authors expected their audience to know various elements beforehand. Satō saw the fact that the pandemic of 1918-1920 was similar to the previous pandemic of 1889-1890, and that the cause of the disease was still under discussion, as common knowledge. Additionally, he expected the audience to value the discussion the same as he did, namely still unresolved.[302] Sasaki expected his audience to have heard and read so much about the epidemic influenza, that it had become a cliché topic to write about. Although it was only May 1920 when his article was published, he felt he had to argue as to why he was still writing about the topic.[303] Shimizu and his colleagues expected the reading audience to agree on their view that the previous pandemic of 1889-1890 was caused by the Pfeiffer's bacillus.[304] Also Miyashita considered the previous pandemic to be common knowledge, but gave a longer explanation about eye diseases, apparently expecting less knowledge about this topic.[305] A common value that both Miyashita, Nakamura and Fuji expected their audience to agree upon, is that it could be hard to research influenza and concurring symptoms, either because symptoms only arose days after the onset of a disease, or because the disease spread so fast after the onset, or because of a lack of patients at the end of the epidemic.[306]

Intertextuality is present in the references to other sources, both Japanese and from abroad, in order to examine whether the cases they encountered were indeed of the influenza pandemic that spread worldwide.[307] Shimizu and colleagues described the discussion about the cause of the influenza pandemic in other countries and mentioned

[300]該問題解決の一助たらしめむとす, referring to the problem of the unknown cause of the epidemic influenza. Shimizu et al. 1919, p. 364.
[301] Miyashita 1919, p. 1387.
[302] Satō 1923, pp.89-90, 138;
[303]流行性感冒と云えば、最早陳腐な表題であるが… , Sasaki 1920, p. 1445.
[304] Shimizu et al. 1919, p. 364.
[305] Miyashita 1919, p. 1390.
[306] Miyashita 1919, p. 1390 ; Nakamura 1921, p. 337 ; Fuji 1920a, p. 667.
[307] Satō 1923, p. 90; Shimizu et al. 1919, p . 364; Fuji 1920a, p. 666 ; Nakamura 1921, pp. 332, 337.

how even Richard Pfeiffer himself could not confirm the Pfeiffer's bacillus in all cases.[308] Additionally, Fuji referred to the way in which an infectious disease spreads with the German term "*Infektion Modus*", indicating his approach was influenced by German research.[309] Regarding interdiscursivity, some authors used phrasings which are reminiscent of other discourses to describe how researchers were stuck in the debate about the origin of the epidemic. Shimizu and his colleagues wrote that as long as a solution to the discussion would not come, researchers would not get further than to be "wandering in the fog"[310], which is a phrasing that sounds somewhat romantic as opposed to the scientific tone of the rest of the article. Similarly, Sasaki called the fact that preventive measures and treatment were not based on a fixed origin a "large scholarly disgrace" and "large loss in reality"[311], using normative terms to judge the circumstances, which might remind of a discourse related to the battlefield where a loss is a disgrace.

At the level of the word, it will first be described which different terms for the epidemic influenza where used by the authors. All authors used the term *ryūkōsei kanbō* in their title, but they sometimes also used other terms. Satō referred to the disease with the Japanese *Supein byō* スペイン病 and Latin "*Morbus Ibericus"*, both meaning "Spanish disease", by which he referred to a foreign origin of the disease.[312] Some authors utilized metaphors, such as the above described metaphor of being lost in the fog, in the text by Shimizu and his colleagues. Another metaphor, utilized to describe the fierceness of the disease, is the phrasing of how the influenza "made lots of souls into victims".[313] Adjectives utilized to describe aspects of the epidemic influenza are as following: it came with a *shippū jinrai* 疾風迅雷 (lightning speed)[314], and a "*ikioi no shōketsu"* 勢の猖獗 (vigorous spread)[315], causing an *muryō no seisanryoku genshō* 無量の生産力減少 (immeasurable decline in production) and *kazu ōku no jinmeiteki gisei* 数多くの人命的犠牲 (large numbers of human sacrifices)[316]. These adjectives reduced the complex reality of the epidemic influenza to one of its characteristics, often laying the focus on its threatening aspects. Another aspect of vocabulary to consider is that of pronouns, which might indicate a process

[308] Shimizu et al. 1919, p. 364.
[309] Fuji 1920a, p. 666.
[310]五里霧中の裡に彷徨せるに過ぎず, Shimizu et al. 1919, p. 364.
[311]学問上大なる恥辱 であり、又 実際上大ナル損失である, Sasaki 1920, p. 1445.
[312] Satō 1923, p . 89.
[313]数多くの生霊を犠牲にせし…, Fuji 1920a, p. 666.
[314] Fuji 1920a, p. 666.
[315] Shimizu et al. 1919, p. 364.
[316] Sasaki 1920, p. 1445 .

of othering.[317] Satō made a distinction between two groups: he identified with a smaller group of scholars that saw pneumonia as a result of the pathogen of the disease advancing into the lungs and distanced himself from the larger group of scholars which generally accepted that pneumonia was just a secondary infection.[318]

On the level of the sentence, certain constructions of active or passive verbs can give or deny agency to someone or something, making them into a victim or culpable.[319] In the case of the epidemic influenza, authors gave the influenza agency, depicting it as a force on its own to which people fell victim. Satō described how the flu "swept almost the whole world"[320] and similarly, also Fuji described how it "ferociously swept the whole world".[321] Additionally, a construction with both negation in the subclause and main clause can be a sign of performativity of a text.[322] An example can be found in the text by Utsui, who emphasized the precarious situation that followed out of the lack of confirmation of what was the cause of the epidemic influenza: "not knowing the cause of the disease, the preventive manners cannot be fully effective and we cannot evade that the scientific basis is weak".[323]

On the level of the paragraph, sentences can be written without an explicit relation between the sentences, and this can be either just descriptive or part of an argument. For example, the way in which Satō listed his conclusions in bullet points, is only descriptive.[324] On the other hand, Shimizu and his colleagues listed all bacteria that were discussed at the time as possible causative agents of epidemic influenza, to strengthen their argument that scholars could not come to a conclusion and were still in the dark regarding the actual cause of the disease.[325] Similar to Satō, Shimizu and colleagues wrote their conclusions down in a list, but in their case, an implied causality and argumentation seems to be present. They stated they found the influenza bacillus, but did not find the diplococcus in their samples. While not explicitly drawing a conclusion from these findings, they seemed to imply that this might mean that Pfeiffer's bacillus was the cause of influenza.[326]

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[317] Beyen 2019, pp. 89-92.
[318] Satō 1923, p. 138.
[319] Beyen 2019, pp. 93-96.
[320]殆ど全世界を風靡し, Satō 1923, p. 89.
[321]勢にて全世界を風靡し, Fuji 1920a, p. 666.
[322] Beyen 2019, pp. 97-98.
[323]本病の原因尚不明に属する時其予防方法の完備する能はず学術的根拠薄弱なるを免かれず , Utsui 1920a, p. 568.
[324] Satō 1923, p. 138.
[325] Shimizu et al. 1919, p. 364.
[326] Shimizu et al. 1919, p. 389.

Looking at the whole of the texts, while they largely were descriptive, some performative and normative elements can be found, forming the narrative. The narrative in Nakamura's text is that while he was asked to research complications of epidemic influenza, he could not get good results as the number of patients with patients in 1921 was too small. He commented on this problem stating that sadly for research, but luckily for society, there was no new influenza epidemic and that therefore research materials were scarce.[327] In Fuji's article, some personal elements came to the front, for example, when he stated that he had himself experienced the epidemic influenza and therefore could imagine it. However, the text was generally rather descriptive, except for the performative part where he argued as to why his research into the spread and not the pathogen could be useful: he stated that if the way in which the epidemic spread would be known, it would become possible to take appropriate preventive measures and stop the spread early on.[328] Also the text of Utsui was not solely descriptive. The article was a kind of review of the different measures and treatments of the epidemic influenza at the time, which were as Utsui put it, in chaos. He compared the vaccines of both the Kitasato Institute and the Institute of Infectious Diseases of Tokyo Imperial University and scrutinized other scholars for not taking into account the different living circumstances of subjects when doing comparative research. After a critical review of all preventive measures known at the time, he concluded that it was not possible to systematically ascertain which one worked better.[329] The text by Sasaki took a similar form, in which the author gave his opinion on the different treatments, also stating his personal preference for the mixed vaccine over the vaccines only targeting the influenza bacillus or pneumococcus. He concluded that as the treatment measures for secondary complications such as pneumonia did not work efficiently, the focus should be on the period right after the onset of the disease, in order to prevent cases of influenza from worsening.[330] Miyashita's article was rather descriptive, and was built on the assumption of the author that after the first epidemic of the fall of 1918, another epidemic would come, as was the case in the pandemic of 1889-1890. The author expressed the feeling of necessity to inform people of the symptoms of eye diseases he observed in the fall, as he expected them to return in a future epidemic.[331]

[327] Nakamura 1921, p. 332.
[328] Fuji 1920a, p. 667 ; Fuji 1920c, p. 891.
[329] Utsui 1920a, pp. 569-70 ; Utsui 1920b, p. 657.
[330] Sasaki 1920, p. 1450.
[331] Miyashita 1919, pp. 1387-90.

4.5.5. Conclusions from Discourse Analysis

Ōkawara and his colleagues at the Kitasato Institute, together with Tsurumi who was active in Manchuria and Matsushita who was a Kyoto scholar, were convinced that Pfeiffer's bacillus was the cause of epidemic influenza. They expected the audience to know about the ongoing debate, but not all of them expected their readers to agree with the point of view that the problem had been solved. Ōkawara and colleagues and Tsurumi who wrote their articles earlier on in late 1918 and early 1919, focused especially on the topic of the causative agent of the disease, and argued extensively for their point of view in the debate.[332] The other authors, namely Umeno and colleagues, Matsushita, and Yabe, wrote their articles later in August 1919, 1920 and 1921, and they took the Pfeiffer's bacillus as a commonly accepted cause of the disease and elaborated on other elements, such as vaccination against the disease.[333] Ōkawara and colleagues depicted the disease as a threat and the battle against the disease as a war. They distanced themselves from other scholars who did not agree with their point of view and judged that scholars who did not agree with them were not capable or did not have the right equipment to find the true cause of the disease: Pfeiffer's bacillus.

The scholars representing the opposite stance in the debate, were Yamanouchi and Sakakami, who together wrote an article on the causative agent in epidemic influenza.[334] Although only one article written from this point of view was included, as it was published in the international journal the *Lancet*, this one article reached an international audience. This article was published in June 1919, which was still in the middle of the pandemic, and it took a clear stance, stating without much hesitation that the causative agent of the epidemic influenza could not be one of the bacteria known at the time.

The third group of sources was written by Onodera, Tanaka, Yoshizawa and Kubo, Satō, and Fujinami and Matsuhira, who all doubtingly accepted the Pfeiffer's bacillus as a possible cause of influenza, but focused more on other complications and factors.[335] These authors expected a reading audience that agreed that the cause of the epidemic influenza was still under debate, but at the same time was willing to accept Pfeiffer's bacillus as a possible cause. Scholars of this group such as Fujinami and Matsuhira and the two Kyūshū Imperial University scholars, focused on the one hand on complications such as pneumonia and on the other hand on contributing factors. They chose not to engage in the discussion about what the causative agent could be,

[332] Ōkawara et al.1918 ; Ōkawara et al. 1919 ; Tsurumi et al. 1919.
[333] Umeno et al. 1919; Yabe 1922 ; Matsushita 1920.
[334] Yamanouchi et al. 1919.
[335] Onodera 1919; Yoshizawa and Kubo 1919; Satō 1920: Fujinami and Matsuhira 1921; Tanaka 1926.

because, as Onodera put it: “only the discovery of a pathogen is insufficient to explain the outbreak of an infectious disease”.[336]

The last group of scholars, which includes Sasaki, Utsui, Satō, Fuji, Miyashita, Nakamura, Arai, and Shimizu and colleagues, wrote their articles from the point of view that while an agreement was not yet reached in the discussion about the cause, other aspects of the disease deserved attention.[337] Several of the articles such as those by Shimizu and his colleagues, Sasaki, and Utsui, reported on the different measures and treatments, often criticizing bacteriological and pathological researchers for not finding enough evidence to prove the cause of the disease.[338] They all expected the public to know about the ongoing debate, but also saw it as evident that the discussion was not over yet, in contrast to the scholars of the first two groups who were firmly convinced they knew the cause, being it either the Pfeiffer’s bacillus, or a still unknown cause in the form of a “filter-passing” agent.

What can be concluded from the whole of the primary sources, is that all scholars of the medical fields related to infectious diseases knew the ongoing debate about the origin of the epidemic influenza and also knew the main points of view, whether they took a position in the debate or not. This could be determined from the analysis of the relation between the author and audience which brought to light that most authors introduced the ongoing discussion about the causative agent of the disease without much explanation, as they expected their audience of fellow scholars to know about this already.

[336]病原体の発見のみでは伝染病発生の説明には不十分であります, Onodera 1919, p. 626.

[337] Sasaki 1920; Utsui 1920b; Satō 1923; Fuji 1920a; Miyashita 1919; Nakamura 1921; Arai 1918; Shimizu et al. 1919.

[338] Shimizu et al. 1919, p. 364; Sasaki 1920, p. 1445; Utsui 1920b, p. 657.

5. Conclusion

Many scholars who studied the epidemic influenza of 1918-1920, only mentioned the debate about the origin of the disease and the attempts to prevent the disease with vaccines as a sidenote. From the standpoint of the current knowledge about medicines it is almost certain that the vaccines at the time were all equally ineffective and that the result of the discussion about the causative pathogen did not even get close to the real cause, which was a virus. However, looking at the situation of the Japanese medical experts from their point of view, and their temporality, it became clear that the pandemic functioned as an event in which the different experiences of scholars, the differences between institutions with their own path dependencies, and the beginning of a paradigm shift in the preventive medicine field came to the front. In their attempt to find solutions, scholars drew from their past experiences in order to cope with the situation in which they found themselves. However, the causative agent of the epidemic influenza could not be easily clarified, which made some scholars doubt the principles they had thought to be true, while others desperately held on to their point of view which was determined by their education at their academic institutions in Japan and abroad, which was in its turn part of the bacteriology paradigm. In general, the new experience of the epidemic influenza gave a boast to experimental medicine and was the start of the standardization of the field of experimental vaccines.

This thesis was the first work that used a framework combining the concept of "space of experience" and discourse analysis to analyze the backgrounds and academic articles of 20 Japanese authors in an attempt to fill parts of the lacuna within the medical history of the "Spanish flu". The analysis brought to light that the authors had various backgrounds and various opinions about the pandemic and its cause. Considering the background of the authors, they came either from an imperial university or were active at a prefectural medical college or private institution. They all had a direct or indirect link with medical research in Europe, either because they traveled there themselves, or because they received guidance from a scholar who had studied abroad. Therefore, the dominant paradigm started by the German bacteriologist Robert Koch was also the path followed by many Japanese scholars. Additionally, the authors shared a communicative memory which encompassed the bacteriological advancements as a measure against the many infectious diseases during the past 80 years. The authors belonged to different generations. Most of them were born between 1880 and 1884, but there was also an older generation born before 1880 and a younger generation born after 1884. The younger generation received guidance

for their articles from professors who were roughly part of the same generation as the oldest authors who wrote an article about the pandemic.

Looking at the discourse analysis of the articles written by the medical scholars, it became clear that similar "spaces of experience" did not simply lead to one discourse, but that the reality was a more nuanced picture. Based on the analysis of the introductions and conclusions, four different positions in the debate could be discerned: authors who saw Pfeiffer's bacillus as the cause of the influenza pandemic, those who thought the pathogen had to be a "filter-passing" agent, those who thought there was no agreement on the cause but saw Pfeiffer's bacillus as a possible explanation, and finally those who thought there was no agreement on the cause and instead focused on secondary complications and other factors. Some of the authors who graduated in the same year from the same institution took opposite positions in the debate: Sakakami Kōzō and Tanaka Tatsusaburō both had the same educational background, but thought respectively that the epidemic influenza was caused by a filterable agent, and on the contrary that it was caused by the Pfeiffer's bacillus. The same can be said of the Tokyo Imperial University graduates Yamanouchi Tamotsu and Tsurumi Mitsuzō. This showed that education could not be seen as a deciding factor influencing the conceptions about epidemic influenza.

Regarding the institutions to which the authors belonged at the time of the pandemic, it is remarkable that all Kitasato Institute members supported the theory that Pfeiffer's bacillus had to be the cause of the disease. This is probably due to the path dependency of scholars within the institute which was founded by Kitasato Shibasaburō who was, like Richard Pfeiffer, a student of Robert Koch. However, on the other hand, not all scholars from imperial universities were convinced that the Pfeiffer's bacillus was certainly not the cause of epidemic influenza. Satō Kiyoshi and Yoshizawa Koreo, who were both part of the Institute of Infectious Diseases of Tokyo Imperial University, saw the Pfeiffer's bacillus as a possible causative bacterium, although they were not as firmly convinced as the members of the Kitasato Institute. Satō Kiyoshi also worked closely together with Fujinami Akira of Kyoto Imperial University and they focused on pneumonia. This brought to light that one author cannot easily be pinned down on a discourse in one article, as his point of view can change through time as seemed to have been the case for Satō who in 1920 mentioned Pfeiffer's bacillus as a possible cause, but in 1923 did not and instead focused on pneumonia.

The different explanations for what caused the epidemic influenza in different institutions were also reflected in the vaccines they produced: the firmly confirmed

Kitasato Institute produced vaccines solely based on Pfeiffer's influenza, while the at Tokyo Imperial University the origin of the disease was still doubted and the focus lay on preventing secondary infections with a mixed vaccine, based both on Pfeiffer's bacillus and pneumococci and diplococci. Lastly, from both private universities and imperial universities, many scholars did not mingle in the discussion of the origin of the epidemic influenza, but instead focused on complications. This shows that while the scholars started to doubt the bacteriological paradigm, it was still hard to take a path in a different direction leading possibly towards a new paradigm.

Looking at the generations, one certain point of view in the discussion cannot easily be linked to one generation. For each of the four positions in the debate, there are scholars both from the older generation, and the younger generation. However, what is remarkable, is that most of the authors born in 1880-1884, which was the largest cohort, such as Yoshizawa Koreo, Onodera Naosuke, Satō Kiyoshi, Arai Tsuneo, Miyashita Sōsuke, and Nakamura Noboru, thought the cause of the epidemic was undecided. These authors were in their early thirties and were the youngest authors who wrote their articles without guidance of a scholar of a previous generation. They could be seen as representing the generation which experienced or learned about the paradigmatic shift from pathology to bacteriology, and which therefore expected more developments in the future. However, Tsurumi Mitsuzō and Yamanouchi Tamotsu were both part of this generation as they were born in 1880, and while Yamanouchi was one of the early discoverers of a "filter-passing" agent, Tsurumi held on to the Pfeiffer's bacillus as pathogen, showing that the year of birth does not determine one's perception of reality and that a generation is an artificial construct to which exceptions will always exist.

The years of the pandemic were a period of scientific uncertainty which showed signs of a crumbling paradigm. From the analysis it became clear that only few scholars were certain of their solution to the disease, and that they started working on a vaccine early on, with the support of the Sanitary Bureau of the Home Ministry. These few scholars were part of the Kitasato Institute which firmly held on to the paradigm of bacteriology. However, some scholars such as Yamanouchi and his colleagues contested this paradigm by suggesting that the cause of the disease could be a "filterable agent". Tellingly, Yamanouchi Tamotsu and his colleague Sakakami Kōzō were both not affiliated to a university, meaning that this possibly give them the freedom to think beyond the paths that were paved within the academic institutions. Although they were on the path towards the actual cause, at the time of the pandemic they were only discovering the possible existence of this new pathogen, and were not

close to developing a vaccine against it. Meanwhile the largest part of scholars doubted the Pfeiffer's bacillus. Some scholars, such as Utsui Ryūta scrutinized the comparative research with vaccines without taking into account living circumstances of patients. This could be seen as the beginning of a standardization of experimental research and as the start of a more refined understanding of social factors in public health. Furthermore, the general undecidedness about the cause of the epidemic influenza shows that the majority of the scholars started to doubt the bacteriological paradigm. While the paradigm only shifted to virology in 1933, the early cracks in the bacteriological paradigm can already be observed in the discussion held in 1918-1920.

Further research could study how this uncertainty within the medical field was reflected in the media environment at the time of the pandemic. Another possible research direction would be to look into how the "Spanish flu" itself functioned as a "space of experience" in the lives of the scholars discussed in this thesis. Many authors in their articles referred to the past influenza pandemic of 1889-1890 as a point of reference, and the influenza pandemic of 1918-1920 would probably fulfill the same function as a "space of experience" drawing their "horizon of expectation". For this purpose the focus could be on one of the twenty authors, utilizing sources such as journals or letters in order to gain a deeper understanding of the personal experiences. Lastly, it would be interesting to find out what the researchers contributed to European medicine during their numerous studies abroad.

6. Appendix

6.1. Articles concerning epidemic influenza in the journal *The Kitasato Archives of Experimental Medicine* (1918-1923)

The articles included as primary sources in this thesis are marked in bold.

	Date	Volume, no.	Title	Author
1.	1918	Vol. 2, no. 1	Uber die Wirkung des sensibilisierten Cholera serovaccins (p. 1-12)	K. Shiga, R. Takano and S. Yabe
2.	1918	Vol. 2, no. 1	Die Anwendung des Cholera-Serovaccins und die Erfolge desselben (p. 13-42)	S. Yabe
3.	1918	Vol. 2, no. 1	On sensitized Plague Vaccine and its practical Application (p. 67-86)	T. Kitano and K. Sukegawa
4.	1918-12	Vol. 2, no. 3	**On the Cause of Influenza that prevailed in 1918 (p. 335-?)**	**I. Ōkawara, T. Tanaka, Y. Watanabe, R. Koyama and T. Satō**
5.	1919-12	Vol. 3, no. 2	**On the Experimental Immunological Tests of Anti-Influenza Serum (p. 151-189)**	**S. Umeno, Y. Watanabe and T. Satō**
6.	1920-12	Vol. 4, no. 1	Leucocytes in Influenza in special Reference to their Etiological Meaning (p. 1-40)	S. Yabe
7.	1921-9	Vol. 4, no. 3	On the nature of paralysis due to polished rice disease in domestic fowls (An abstract from the paper read before the meeting of the Kakke- Beri beri Investigation Committee on March 9, 1920) (p. 207-216)	Dr. G. Kato, Dr. S. Shizume and Dr. R. Maki
8.	1922-03	Vol. 5, no. 1	Untersuchungen uber Denjenigen Bestandteil des Blutes, welcher zum Wachstum der Influenzabacillen notwendig ist (p. 34- 66)	M. Terada
9.	1922-03	Vol. 5, no. 1	**The Leucopenia after the Inoculation of Influenza Vaccine into the Human Body (p. 67-78)**	**S. Yabe**
10.	1922-11	Vol. 5, no. 2	Untersuchungen über denjenigen Bestandteil des Blutes, wek her zum Wachstum der Influenzabazillen notwendig ist. (Fortsetzüng) (p.62-91)	M. Terada

6.2. Articles concerning epidemic influenza in the journal *Chūgai iji shinpō* 中外医事新報 (1918-1933)

The articles included as primary sources in this thesis are marked in bold. As many articles were short summaries of articles previously published elsewhere, the original journal was also given.

	Date (Volume)	Original title	Author	Original Journal
1.	1918-11 (927)	流行性感冒患者ノ腸粘膜及ビ尿所見	スタイン	Wiener Klinische Wochenshrift 1917, no 17
2.	1918-11 (927)	現今流行スル流行性感冒ト「インフルエンザ」菌	テー･アル･リツトル ; ピピー･エ･ウイリアムス	Lancet, Londen July 13 1918
3.	1918- 12(930)	恐ルベキ流行性感冒	キーガン	Jour. A. M. A. Sept. 28, 1918
4.	1919-03 (935)	流行性感冒ノ療法	レルボール	Paris Médical Oct 12, 1918
5.	1919-06 (942)	流行性感冒ニ於ケル血液ノ變化ニ就テ	宇野規矩治	/
6.	1919-08 (945)	流行性感冒ノピルケー反應ニ對スル影響	ブルウムウイルド ; マチール	American Review of Tuberculosis, Baltimore May 1919, no 3
7.	1919-08 (945)	妊婦ト流行性感冒	チトウス ; ヂヤミソン	The Journal of the A. M. A. June 7, 1919
8.	1919-10 (950)	流行性感冒ト肺結核	ドイシユ	Münchener medische Wochenschrift 25 April 1919
9.	1919-11 (952)	流行性感冒ニ於ケル外科的併發症	スチツヒ	Deutsche Medische Wochenschrift 1919, no 25.
10.	1919-12 (953)	流行性感冒後ノ脱毛及び其療法	ハイス･メリアン	Korrespondenz-Blatt fûr Schweizer-Aerzte 1919, no 5
11.	1919-12 (954)	叢談 流行性感冒ト肺結核	ドクトル エフ ; ライヒトワイス	No journal mentioned
12.	1920-05 (964)	一九一八乃至一九一九年ニ於ケル世界的大流行ノ流行性感冒病屍ニ於ケル心筋ノ變化殊ニソノ壞死ニ就テ	相原博	/
13.	**1920-06 (965)**	**最近本邦ニ於ケル流行性感冒流行ノ機轉ニ就キテ**	**富士貞吉**	/
14.	**1920-07 (967)**	**最近本邦ニ於ケル流行性感冒流行ノ機轉ニ就テ(承前)**	**富士貞吉**	/
15.	**1920-07 (968)**	**最近本邦ニ於ケル流行性感冒流行ノ機轉ニ就テ(承前)**	**富士貞吉**	/
16.	1920-10 (973)	流行性感冒ノエレクトラルゴール療法 /	コルレル	Amer J. Of D. of Childr., June 1920
17.	1922-06 (1014)	妊娠中ニ於ケル流行性感冒ノ療法	ワルテル･ケルチング	No journal mentioned
18.	**1926-03 (1101)**	**流行性感冒ト氣象トノ關係**	**田中吉左衞門**	/

6.3. Articles concerning epidemic influenza in the journal *Igaku chūō zasshi* 医学中央雑誌 (1918-1921)

The articles included as primary sources in this thesis are marked in bold.

	Date	Volume, no.	Original title	Author
1.	1918	Vol. 16	流行性感冒病原ニ就テ	清水永 ; 鈴木賢太郎
2.	**1919/2/11**	**Vol. 16**	**今回ノ流行性感冒ニ併發セル二三眼症ニ就テ**	**宮下左右輔 (医学博士)**
3.	**1919/5/5**	**Vol. 16 no. 22**	**去秋大連に於ける流行性感冒ニ就テ**	**鶴見三三　（医学博士） 豊田太郎　（医学士）; 杉田卯吉　（南満州医学堂医学士）; 青木勉（南満州医学堂医学士）**
4.	**1920/4/5**	**Vol.17 no. 20**	**流行性感冒ノ原因及ビ療法ニ就テ**	**佐々木秀一**
5.	**1920/10**	**vol.18 no. 9**	**流行性感冒ノ豫防及ビ治療ニ就テ**	**碓居龍太（医学博士）**
6.	**1920/11**	**vol 18 no. 10**	**流行性感冒ノ豫防及ビ治療ニ就テ (承前)**	**碓居龍太（医学博士）**
7.	1920/12	vol.18 no. 13	今春ノ流行性感冒ニ於ケル細菌學的檢査ノ成績ニ就キテ	權藤健兒
8.	1921/01	vol. 18 no. 15	流行性感冒患者血清ノ同患者ヨリ培養シ得タル數種ノ菌ニ對スル凝集反應ニ就イテ	仲俣謹一郎

6.4. Primary sources listed by the four points of view of the texts

The 24 primary sources, (reduced to 20 sources because of some continuing articles), are listed here in the four groups utilized in the discourse analysis. Names in bold are the authors who's "spaces of experience" were analyzed.

		Date	Author	Original title	Journal
Pfeiffer's Bacillus as cause	1.	1918-12	Ōkawara [Ichitarō]大河原 一太郎, **Tanaka Tatsusaburō 田中達三郎**, **Watanabe Yoshimasa 渡邊義政**, **Koyama Ryō 小山諒,** Satō T.[Tadashi] 佐藤正	On the Cause of Influenza that prevailed in 1918	Kitasato Archives of Experimental Medicine
	2.	1919	Ōkawara Ichitarō 大河原 一太郎, **Tanaka TatsuSaburō 田中達三郎**, **Watanabe Yoshimasa 渡邊義政**, **Koyama Ryō 小山諒**, Satō T. [Tadashi] 佐藤正	流行性感冒ノ原因ニ就テ	細菌學雜誌
	3.	1919-12	Umeno Shinkichi 梅野 信吉, **Watanabe Yoshimasa 渡邊義政** Satō T. [Tadashi]佐藤正	On the Experimental Immunological Tests of Anti-Influenza Serum	Kitasato Archives of Experimental Medicine
	4.	1920	**Matsushita Teiji 松下禎二**	衛生百話: 目次:第八話 流行性感冒は恐るべし	(Book)
	5.	1922-03	**Yabe Sennosuke 矢部専之助**	The Leucopenia after the Inoculation of Influenza Vaccine into the Human Body	Kitasato Archives of Experimental Medicine
	6.	1919-05	**Tsurumi Mitsuzō 鶴見三三**, Toyota Tarō 豊田太郎, [Sugita Ukichi]杉田卯吉, Aoki Tsutomo 青木勉	去秋大連に於ける流行性感冒ニ就テ	医学中央雑誌
" Filter-passing" agent	7.	1919-06	**Yamanouchi Tamotsu 山内保,** **Sakakami Kōzō 坂上弘蔵**, Iwashima S.[?]	The infecting agent in influenza: an experimental research	The Lancet
No agreement on cause, but possibly Pfeiffer's bacillus	8.	1919	**Yoshizawa Koreo 吉澤惟雄**, Kubo Kametarō 久保龜太郎	浦潮斯徳米國赤十字社病院及米國軍隊ニ於ケル腦脊髄膜炎菌及「インフルエンザ」菌携帯者調査成績	実験医学雑誌
	9.	1919	**Onodera Naosuke 小野寺直助**	流行性感冒ノ原因ニ關スル二三ノ觀察	日本内科学会雑誌
	10.	1920	**Satō Kiyoshi 佐藤清**	流行性感冒ニ於ケル黄疸ニ就テ	日本消化機病学会雑誌
		1920	**Satō Kiyoshi 佐藤清**	流行性感冒ニ於ケル胃腸ノ剖檢所見ニ就テ	日本消化機病学会雑誌
	11.	1921	**Fujinami Akira 藤浪鑑,** Matsuhara Ryōichi 松原良一	流行性感冒ノ病理解剖	日本内科学会雑誌
	12.	1926-03	**Tanaka Kichizaemon 田中吉左衛門**	流行性感冒ト氣象トノ關係	中外医事新報

No agreement on the cause, focus on complications	13.	1918	**Arai Tsuneo 荒井恒雄**	流行性感冒ニ因スル腓骨神經麻痺ニ就テ	順天堂医学
	14.	1919-02	**Miyashita Sōsuke 宮下左右輔**	今回ノ流行性感冒ニ併發セル二三眼症ニ就テ	医学中央雑誌
	15.	1919-07	**Shimizu Ryō 清水亮**, [Kuroda Osamu]黒田 收, Hayashi Takeo 林武雄	流行性感冒ノ細菌學的研究	金澤醫學專門學校十全會雜誌
	16.	1920-05	**Sasaki Hideichi 佐々木秀一**	流行性感冒ノ原因及ビ療法ニ就テ	医学中央雑誌
	17.	1920-06	**Fuji Teikichi 富士貞吉**	最近本邦ニ於ケル流行性感冒流行ノ機轉ニ就キテ	中外医事新報
		1920-07	**Fuji Teikichi 富士貞吉**	最近本邦ニ於ケル流行性感冒流行ノ機轉ニ就テ(承前)	中外医事新報
		1920-07	**Fuji Teikichi 富士貞吉**	最近本邦ニ於ケル流行性感冒流行ノ機轉ニ就テ(承前)	中外医事新報
	18.	1920-10	**Utsui Ryūta 碓居龍太**	流行性感冒ノ豫防及ビ治療ニ就テ	医学中央雑誌
		1920-11	**Utsui Ryūta 碓居龍太**	流行性感冒ノ豫防及ビ治療ニ就テ(承前)	医学中央雑誌
	19.	1921	**Nakamura Noboru 中村登**	流行性感冒ニ於ケル我專門領域ノ合併症ニ就テ	大日本耳鼻咽喉科會會報
	20.	1923	**Satō Kiyoshi 佐藤清**	大正七-九年度ニ於ケル流行性感冒ノ病理解剖	実験医学雑誌

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