

## Sentimental Education. Sound and Silence at History Museums

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### Abstract

Using an interdisciplinary approach, this article analyses the uses of sound and silence at three Polish history museums: POLIN – Museum of the History of Polish Jews, the Warsaw Rising Museum and the Historical Museum of the City of Krakow's exhibition *Krakow under Nazi Occupation 1939-1945*. It argues that in these museums sounds and silence serve a sentimental education. They are used both to impart historical knowledge in a sensory way and to affectively engage visitors. Diegetic sounds thereby generally serve the communication of historical knowledge, whereas non-diegetic sounds are used as affective triggers. In this way, a sonic immersion is achieved that induces visitors to feel as if they were in the past as well as inviting them to emotionally engage with this past.

**Keywords:** sound, silence, history museum, memory, immersion, affect

### Prelude<sup>1</sup>

Warsaw 2015: I am standing in a hail of bullets. All around me, I hear machine guns and explosions. Every ten minutes or so, a bomb falls right next to where I am standing. Amid this commotion, I hear another sound – a beating heart. I feel the sound going right through me, leaving a strange feeling of unease. Around me, I hear people walking, talking and laughing. I also hear the sound of voices and musical scores emanating from television screens.

Warsaw 2015: I am on a market square. I hear birds singing. I hear horses and people walking on gravel. I hear them talking in languages that I do not understand and cannot quite make out. I hear coins falling onto tables. From a tavern next to the market I distinguish popular music and clicking glasses. The sounds are appealing. I have only just escaped from an attack by the Cossacks that was accompanied by the sounds of burning houses, whinnying horses, rattling swords and gloomy music.

Krakow 2015: I am at a train station, listening to announcements. A steam train is arriving and I hear a barrier closing. I will not take the train, I will walk right into the city under bombardment. Bombs are falling around me, sirens are howling, machine guns firing.

Despite the sounds of war and conflict, I remained relatively calm in all the scenarios described above. I was not afraid, running for shelter, or otherwise trying to protect myself. Nor were the people around me. The sounds did not have a visible or sensible impact either: the machine guns and bombs did not destroy anything, no houses went up in fire, no horses stormed past me, the train and the barrier remained invisible, the ground did not vibrate and I could not smell the smoke of burning houses and explosives. The scenarios did not take place in the streets of Warsaw and Krakow: they took place in the exhibition rooms of POLIN – Museum of the History of Polish Jews (hereafter POLIN) – The Warsaw Rising Museum and the exhibition *Krakow under Nazi Occupation 1939-1945* in the former buildings of Oscar Schindler's enamel factory.

What I have described is only one side of my experience in the museums: the aural one. Soundscapes have been explicitly produced for the museums' main exhibitions. The exhibition makers of the three museums (and of many more that I will not look at in detail here) decided

that they could not convey their messages through objects, images and text alone. But why did they resort to sound? What messages do they wish to convey in this way? And what effect can sound have on visitors' perception of the exhibitions?

The use of soundscapes serves what I – with apologies to Gustave Flaubert – will call a 'sentimental education'.<sup>2</sup> The word *sentimental* goes back to the Latin verb *sentire* – to perceive, to feel. Etymologically speaking, *sentimental* describes both experiences made through the senses, as well as emotions as a response to those experiences. It is in this double sense that I will use the concept: in the museums sounds are used to impart historical knowledge in a sensory way, but also to affectively engage visitors and induce them to remember. It serves both historical learning and cultural memory. As I will show, this sentimental education is achieved through the use of immersive strategies.

Furthermore, I contend that the use of sounds in museums can only be studied in an interdisciplinary way. Despite the importance of sounds in rituals of memorialization, for example in music, dances or – the opposite – minutes of silence and the increasingly frequent use of reproduced sounds in museum settings, both memory studies and museum studies have so far largely neglected sounds. While historical studies analyzing the sounds of the past, although still scarce and pointing out the visual bias of historiography, have abounded over the last twenty odd years (cf. Smith 2004; Rosenfeld 2012; Müller 2012), studies on how sounds are remembered, re-enacted, re-mediated, reproduced – and forgotten – by individuals and communities remain rare (Eckert 2008; Bijsterveld & van Dijk 2009; Maier 2011; Morris 2001; Meyers & Zandberg 2002; Landsberg 2010; Neiger, Meyers & Zandberg 2011). Museum studies, which long concentrated mostly on questions of education, representation or material culture, has lately started to look into a 'sensory museology' (Howes 2014: 259) and to concentrate on 'feeling' rather than on 'meaning' (Message and Witcomb 2015: xlvii, cf. Smith 2015). However, with a few exceptions (Martinz-Turek 2004; Lane and Nye 2005; Jakubowski 2011; Kunz-Ott 2012; Byrne 2012; Cluett 2014; Binter 2014; Bubaris 2014; Koenig 2014; MacKinnon 2014; Schoer 2014; Voegelin 2014; Cox 2015; Bijsterveld 2015) the uses of sounds and silence in museums are hardly ever touched upon. In this article, I will therefore refer to other disciplines in which sound has been a topic such as cultural sound studies and sound history, as well as cognitive psychology, neuroscience, and philosophy.

### Sound and Immersion

Visiting the three museums feels like walking through a series of stage or film sets. Indeed, the exhibition *Krakow under Nazi Occupation 1939-1945* was designed by theatre director Michał Urban and scenographer Łukasz Czuj. The chief curator of the core exhibition at POLIN, Barbara Kirshenblatt-Gimblett, describes the exhibition as a 'Gesamtkunstwerk'<sup>3</sup> or a 'theatre of history' (2015). To her, the exhibition is 'a continuous visual narrative that is organized in acts and scenes, much like a play' in which the visitors 'find themselves on the stage and in the scenography, not on the other side of the proscenium' (Kirshenblatt-Gimblett 2015: 58). All three museums are spaces where the past is experienced – rather than only being exhibited through original objects: they are spaces where visitors are induced to immerse themselves in the past. Even if Kirshenblatt-Gimblett speaks of a 'visual' narrative, the soundscapes are an integral part of this experience. They are, as Olga Szlachcic, one of the sound designers of the soundscapes in POLIN puts it, supposed to give a 'feeling of the time'.<sup>4</sup>

Immersion has, since antiquity, been the goal of the creators of media aiming at temporarily lifting people out of their everyday environment and plunging them into an 'unreal' or virtual elsewhere. Attempts to induce such immersive experiences can be found in frescoes in ancient Rome and Renaissance Italy. They were perfected in dioramas, panoramas and period rooms in the nineteenth century, and more recently in film, computer games and virtual reality (Grau 2003). At the moment, immersion is probably most hotly debated among game designers and the producers and analysts of virtual reality. The concept is generally used in a prescriptive way (cf. Kearney & Pivec 2007; Fencott 1999<sup>5</sup>; Grimshaw 2012): immersion is what the designers want to achieve. It has been defined as human beings' 'ability for not being mentally present in an environment in which they are observably physically present'<sup>6</sup>, as a 'break in presence', defined as 'the moment of switch between responding to signals

with source in environment X to those with source in environment Y' (Slater 2002: 435) or as 'a process, a change, a passage from one mental state to another' (Grau 2003: 13). Thus, immersion happens at the moment in which we – generally temporarily – forget where we are in time and space, and start feeling affectively and emotionally engaged in an elsewhere that is suggested through the immersive medium. There are debates about how immersion actually works (Grimshaw 2012: 356). However, most scholars agree that in order for immersion to occur, the virtual representation needs to include several 'codes of realism' (Grimshaw 2012: 358) and that the more senses it addresses, the more convincing the experience is (Grau 2003: 14f). Arguably, the designers of the nineteenth century panoramas were aware of this when they added sound, wind and smoke effects to their visual illusions (Grau 2003: 70).

In the three museums, although many of the (mostly not original) exhibits can be touched or sat upon, and although POLIN, in its restaurant, offers some traditional Polish Jewish dishes, the sounds are most pertinently used as immersive triggers. The museums follow the example of other immersive media such as panoramas, film or virtual reality in which, after visual effects, the sound effects are most elaborate. Thus, Mark Grimshaw (2012: 359ff) has shown that in first person shooter games, sound is crucial for involving players, whereas Michel Chion (1994: 5) argues that for film, sound functions as an 'added value' that decides the 'definitive impression' made by the image. In fact, cognitive psychologists argue that in spatial awareness our visual and auditory awareness work together to create a holistic picture (Blessner & Slater 2007: 46ff). In other words, we need sound to 'see' properly.

Despite this interplay of the senses – or maybe because of it – hearing is often opposed to the sense of vision for its lack of boundaries and its intangibility. Hearing counts as the 'immersive' sense because it envelops us and we are therefore less likely to achieve critical distance. Marshall McLuhan (2004: 71) defined the 'acoustic space' (as opposed to the 'visual space') as 'both discontinuous and nonhomogeneous', 'related with centres everywhere and boundaries nowhere', while Don Ihde (2007: 82-3) has defined the 'auditory field' as 'omnidirectional'. The visual by contrast is often conceived as clearly demarcated, directional and requiring distance and perspective. Sound scholars like Jonathan Sterne (2012: 9) have rightly criticized this 'audio-visual litany' for 'misattributing causes and effects'. However, as we will see, it is exactly such an idea of hearing as immersive that comes into play in the exhibitions. The immersive effect of the soundscapes is generally enhanced by masking their sources. Played over hidden loudspeakers and often filling a whole exhibition section, the sounds envelop visitors. They can be heard even when visitors engage in relatively distanced cognitive actions such as reading museum texts.

In the museums, as in computer games or films, two expressions of immersion through sounds appear. On the one hand, visitors are induced to feel present at the time and place that is represented. On the other hand, visitors, by being affected, are induced to engage emotionally with this time – either by emphatically mirroring what are imagined to have been the feelings of its protagonists or by emotionally evaluating it from the present. Those expressions of immersion relate to the two facets of sentimental education mentioned above: the construction of historical knowledge in a sensory way and the affective engagement with the past for the sake of memory. They also roughly relate to what in film and game studies are called diegetic and non-diegetic sounds.

Diegetic sounds stem directly from action that can be seen on screen such as the sound of footsteps or the sound of a shot. Non-diegetic sounds or acousmatic sounds, on the other hand, lack visual representation on screen, as with the musical underscore (Grimshaw 2012: 349). Nikos Bubaris (2014: 394), who has adapted these concepts to the museum setting, defines diegetic sounds as sounds that 'refer to the set-up of the exhibition and the immediate relationship between the visitor and the exhibition', whereas non-diegetic sounds 'refer to the presentation of actions that causally unfold outside the space-time of the visit, but frame the visitor's experience and its derived meanings'. For Bubaris (2014: 394-95), the narrative voice on an audioguide is a perfect example of a non-diegetic sound, whereas 'oral histories, audio, audio-visual and multimedia exhibits and the soundscape of displayed cultures' would be diegetic sounds. While those sounds are always in the foreground, Bubaris defines in addition diegetic and non-diegetic 'background' sounds that 'enhance a presentation' such as background music or the sounds of an exhibit once the visitor has moved away. I will not

consider the acousmatic voice on the audioguide. Like Bubaris, I contend that, although the direct sources of the soundscapes in museums are rarely visible, we can speak of diegetic sounds where the soundscape represents the exhibited space and event. This typically happens in displays that resemble dioramas or period rooms, such as the train station in the exhibition *Krakow under Nazi Occupation 1939-1945* or the market square in POLIN. Non-diegetic sounds primarily communicate an atmosphere or emotions. They are generally musical or abstract. Non-diegetic sounds are typical where the affective side of sentimental education is given precedence, while diegetic sounds are used where sensory historical learning is foregrounded. As in film or computer games, there are exceptions to these rules and numerous instances when both diegetic and non-diegetic sounds are mixed. For the sake of analysis, let us first consider both separately.

### Recreating the Soundscapes of the Past

The concept of 'soundscape' was introduced in the late 1960s by the World Soundscape Project at Simon Fraser University in Vancouver and especially by R. Murray Schafer's (1977) influential eponymous publication. Schafer coined the term in relation to landscape. Fully aware of the fleeting nature of soundscapes and their rapid change through what it considered 'noise pollution', the World Soundscape Project toured Canada and five European villages to record sounds. The museums I analyze try to represent such past soundscapes. The problem that such representations pose is that sound recordings are much scarcer than pictures of past events and only available for times since the phonograph was invented in 1877. Sound historians and designers must resort to other media in order to obtain an idea of how the past might have sounded. Karin Bijsterveld (2013: 14, italics in the original), who has reproduced the soundscape of the Dam square in Amsterdam on three different dates for the Museum of Amsterdam observes:

Our knowledge of past soundscapes, transient and intangible as they are, is ... largely dependent on historical texts in which people described what they heard and what these sounds meant to them. At the same time, however, our *imagination* of such soundscapes has been nourished by the soundtracks the makers of radio plays and films created for their productions.

Museums can be added to those creators of our *imagination* of what the past sounded like. When inducing visitors to immerse themselves in the past, they resort to strategies of authentication including techniques of sound reproduction, volume, spatialization – and, more rarely, they use original sound documents.

### Original Sound Documents

Although the three museums deal – either exclusively or inter alia – with contemporary history, they use original sound documents sparingly. These original sounds are often mixed with other, reproduced, sounds. When they are not combined with other sounds, they are generally played in the open, their sound bleeding into other soundscapes and mingling with sounds made by visitors. Like reproduced sounds, original sounds are used to give visitors an immersive experience. Often, the nature of the sounds is not made explicit either. At POLIN, fewer and fewer reproduced sounds are used the closer the narrative moves to the present, as more sound documents were available. For many of those 'audio artifacts'<sup>7</sup>, the origin is made clear. For others, however, it remains in the dark. Thus, in the section on the opening of the Great Synagogue in Warsaw, original recordings of the singing of the cantor are played. When I visited the museum for the first time, I heard the singing; I only learned its source when I interviewed Barbara Kirshenblatt-Gimblett, chief curator of the museum's core exhibition.<sup>8</sup> Thus, original sounds are not yet treated on an equal footing to original objects, for which the provenance is made clear. However, the museums intends to add notes specifying the origins of all of its audio documents in the future.

The centrepiece of the Museum of the Warsaw Rising is a steel monument from which emanates the sound of a beating heart – a feature that I will return to later. Through several

'bullet holes' sounds from the Warsaw Uprising can be heard. Reports from the radio station Lightening are mixed with re-recordings of insurgents' songs and battle sounds. 'One should touch the Monument and listen to it – various sounds and tunes of subsequent days of the Rising can be heard from every bullet hole, recreating the atmosphere of those days', the museum text accompanying the monument reads. The heart in the Museum of the Warsaw Rising exemplifies the immersive use of sound documents. Through the congruence between the sound documents played into the open, reconstructions and original objects, the visitors are made to feel 'the atmosphere of those days'. Whether the sounds are originals or not is secondary to the creation of this atmosphere.

In fact, in order to represent past soundscapes, sound documents might not be the best means. Joshua Waletzky, an expert on Yiddish music, put together a loop representing a Jewish wedding at the end of the nineteenth century for POLIN. He used recordings of songs performed by Polish migrants in the US and Canada in the mid-twentieth century from the collection of folklorist Ruth Rubin, as well as older recordings from theatrical presentations. The recordings were historical but not contemporary to the time represented in the exhibition. Nor were the recordings performed for the occasion represented. Plays often made fun of the original wedding songs through exaggeration. In order to make the songs fit the exhibition, therefore, Waletzky cut out those parts of the songs that were too theatrical. He pointed out that if he had produced the loop for a chapter on Yiddish comedy, he would have kept those elements.<sup>9</sup>

In general, sound has been recorded selectively and explicitly in order to be reproduced for specific purposes such as radio, film or television broadcasts, scientific studies or personal entertainment. Such sound documents can represent past soundscapes. At POLIN, original musical recordings recreate the atmosphere of a café in Warsaw in the interwar period. In general, however, recorded sounds only give a vague idea of the past and require, as Waletzky's soundscape exemplifies, adaptation and reworking before they can be used to represent past soundscapes. First, recording devices inevitably distort sounds and voices. Hitler's voice, used by many museums, although less by the ones under scrutiny here, has become an icon because it was amplified by a microphone for speeches in front of large audiences (Epping-Jäger 2013). Secondly, it is difficult to reproduce a listening experience. By the Second World War, it had become clear that it would be impossible to reproduce the sounds of war by simply recording fighting, for example. For newsreels, sounds were recreated in recording studios. Those sounds still determine our acoustic memory of the war (Ulrich 2013: 245). Finally, for listeners, recorded sounds became part of a more encompassing soundscape and might even have served as background noise. Radio broadcasts, for example, might have been listened to over dinner with the accompanying clatter of dishes. They might have been commented on, or ignored when other conversations were more important. Playing sound documents in the open, integrating them into soundscapes and letting them bleed into other sounds might therefore come close to original listening experiences. However, it also makes it difficult to concentrate on the documents as such. It means relinquishing the sound documents' character as sources to the detriment of immersion.

### **Sound Reproduction**

Such an immersion is primarily constructed through reproduced sounds. While the curators of the exhibition *Krakow under Nazi Occupation* and the Museum of the Warsaw Rising mainly used sounds that were easily available, POLIN applied an elaborate strategy of authentication. The museum hired the dubbing studio Sonica for the production of most of its soundscapes. In order to create an accurate representation of the soundscapes of the past, the producers only chose sounds which they were sure existed at the time. Those sounds were reproduced with contemporary devices. Thus, old coins were used for the sound of coins falling onto a table or a car from the 1920s for the sound of a car driving on cobblestones on pre-war Zamenhofa Street in Warsaw.<sup>10</sup> This practice differs greatly from the production of sound effects in film. Here, sound is often exaggerated in order to make it sound more authentic and reproduced with different devices than those seen on screen (Whittington 2014: 369f).

Many of the soundscapes at POLIN include speech. Here, sound designers were faced with the problem that, especially for events that happened a very long time ago, it is not always clear what language the people spoke. Nor is it clear what a given language sounded like at that time. In what language did the Jewish merchants that came to Poland in the tenth century communicate? For the chatter of voices in the soundscape in their first exhibition room representing a marketplace in the Middle Ages, the sound designers therefore mixed soundbites of people speaking in Arabic, Hebrew and Yiddish. The speech has been rendered indistinguishable. The aim was to create a feeling of the language rather than to present the language itself, Olga Szlachcic, one of the sound designers pointed out.<sup>11</sup> The closer the exhibition moves to the present, the more distinguishable the voices become. In the soundscape of the eighteenth century market square described at the beginning of this article, which incidentally does not sound very different from the soundscape for the medieval marketplace, some of the words of people speaking in old Yiddish are distinguishable – provided visitors understand the language.

A similar strategy was used for sound stations in which historical documents are read aloud. Here, the museum returned to old versions of the languages rather than to their modern variants. Thus, extracts from comments that the Ashkenazi rabbi Moses Isserles, called the Remu, wrote on the Sephardic code of Jewish law by Yosef Karo are heard in old Polish or old Hebrew. Similarly, reproductions of musical pieces were recorded using original instruments. Sonica re-recorded tavern music for the exhibition section on the Jewish town in the eighteenth century, for example.

Hence, at POLIN, the authenticity of soundscapes is guaranteed by the means of reproduction rather than by their historical origin. This practice corresponds to what Elisabeth Mohn, Christian Strub and Geesche Wartemann, reflecting on different concepts of authenticity, have called a 'dilemmatic authenticity'. According to dilemmatic authenticity, every representation is trapped in the dilemma between a desire for an immediate relationship between the 'I' and the 'world' and the realization that every representation is dependent on the means of representation. According to dilemmatic authenticity theory, therefore, an authentic representation tries to hide the representational character of the subject through the means of representation (Mohn, Strub & Wartemann 1997: 4). For the soundscapes, the musical pieces and the reading of documents in *POLIN* this means that, although they are obviously reproductions, the means with which they have been produced veil their reproductive character and disclose the reproductions as maximally truthful. This application of a dilemmatic authenticity can also be observed in the museums' visual representations. An example is the main object – a wooden synagogue from Gwoździec, the original of which was burned down by Nazi occupiers in 1939 and which was rebuilt during several youth camps using traditional building techniques (Kirshenblatt-Gimblett 2014: 166-167).

That the exhibition makers pay so much attention to truthful reproduction can be explained by another concept of authenticity defined by Mohn, Strub and Wartemann (Mohn, Strub & Wartemann 1997: 2): the 'authenticity of authority'. It is probable that none of the visitors would have noticed a less stringent application of the means of reproducing the sounds of the past. However, museums count as maximally trustworthy institutions exhibiting originals and giving an accurate account of the past (Rosenzweig & Thelen 1998: 12). Both in their self-perception and in the perception of their visitors, museums are an authority that guarantees authenticity.

That having been said: while POLIN took its role as an authority guaranteeing authenticity very seriously, the curators of the Museum of the Warsaw Rising and the exhibition *Krakow under Nazi Occupation* paid little to no attention to techniques of reproduction. Even POLIN offers no explanation of the production process of the soundscapes. The reproduction of its visual exhibits, on the other hand, is made explicit within the exhibition, in the catalogue and the articles that Barbara Kirshenblatt-Gimblett has written about the museum. Thus, the soundscapes, although meticulously chosen and assembled, are not treated on an equal footing with the objects and material reproductions yet. The effort put into the production of sonic codes of realism for the experience of immersion remains veiled to the visitors.

### **Space and Volume**

'It is still too quiet', Ania Grzechnik, one of the conservators of the *Museum of the Warsaw Rising*, told me while we were standing on the ground floor of the museum. I looked at her in bewilderment. A massive bomb had seemingly just exploded next to us and after having spent the whole morning in the museum I was weary of the sounds of fighting. She explained:

They were really toned down, because the natural ones are too dangerous. Because many old people come here, many young people, they are not used to hearing this. When you go to military training sites and you get to listen to this, it is very different.<sup>12</sup>

Soundscapes are not only made up of different sounds. They are also made up of the volume of those sounds and their distribution in space. How we perceive these volumes depends on two factors. When considered from a sensory point of view, volume depends on our distance from the sound source. From a cultural point of view, volume depends on laws and social conventions (Blesser & Slater 2007: 31ff). In addition to the concept of soundscape, Barry Blesser and Linda-Ruth Slater (2007: 22ff) use the slightly more precise term 'acoustic arena'. An acoustic arena is 'a region where listeners are part of a community that shares an ability to hear a sonic event' (Blesser & Slater 2007: 22). Although the people within an acoustic arena – the 'acoustic community' (Blesser & Slater 2007: 26) – will hear the same sounds, they have diverging power over those sounds depending on their political or social position. In other words, some individuals have 'sonic power' over others (Blesser & Slater 2007: 31).

The Museum of the Warsaw Rising tries to recreate the soundscape of a city during fighting. Within such a soundscape, sonic power is unequally distributed. It depends on whether one is part of the group of fighters or the group of civilians. It is also determined by who has the weapons that make the most – or the least – noise (cf. Jean 2011). The potential of the noise of fighting to traumatize those who are exposed to it has been recognised since the First World War. During the Second World War, the German and Soviet armies manipulated weapons to demoralize the enemy through the noise they made – or, as in the case of the V2 rocket, the lack thereof (Ulrich 2013: 244). Sonic power is further determined by the ability to detect weapons by their sounds. Since the First World War, soldiers have received acoustic training (Ulrich 2013: 242). Finally, sonic power is determined by the ability to negotiate a cease-fire and thus create silence. When recreating a soundscape, museums also recreate power structures. Depending on which sounds they choose, how they distribute sounds in space and where they establish sound barriers, they decide which acoustic community to recreate and which social position to give visitors within this social community. In the Museum of the Warsaw Rising, the visitor is turned partly into a passive observer, partly into a victim and partly into a fighter of the Polish Home Army. It is impossible to escape the sounds of fighting in the main exhibition space and, at least at the beginning of the visit, some of the sounds of falling bombs come as a surprise. The sounds can be exhausting and threatening, but then again, the songs of the fighters of the Home Army played at different points in the exhibition are uplifting and can induce the feeling of being part of a heroic community.

However, what role visitors take is not only determined by the acoustic community that is recreated, but also by their cultural background, their social position or their gender. Not being Polish, I felt disconnected from the history presented. I considered myself as an outside observer and experienced the sounds of fighting as noisy and disturbing. That the experience of the museum was a different one for other visitors became clear when I watched a group of young Polish men growing enthusiastic about climbing on top of a motorcycle and holding a machine gun, imitating its noise: they clearly identified with the fighters and assumed sonic power within the acoustic space of the exhibition.

Whereas museums can imitate sonic power through volume and the spatial distribution of sounds, sonic power within the museum is, as the quote from Ania Grzechnik above shows, held by those who have access to the volume regulator. In all museums I was told that the soundscapes had been played at a higher volume at the openings of the exhibitions. The volume was eventually turned down because visitors complained and because guides felt

disturbed. Sonic power is also held by other, non-human, actors. Especially in contemporary museums, technical gear such as computers, flat screens and projectors tends to be quite noisy. At POLIN, therefore, the curators tried to keep the upper hand over the sounds that the museum already made.<sup>13</sup> When choosing the volume for a soundscape, sound designers have thus to negotiate between the past and the present; they adapt the wish for an authentic representation to the needs of contemporary museums, which in turn means considering the needs of guides and the sensibilities of visitors. Architecture can be another source of sonic power. In the exhibition *Krakow under Nazi Occupation 1939-1945*, I could make out a sound that was difficult to identify. It was louder than other sounds in the museum. I was soon to realize that it emanated from visitors walking over cracking floorboards in the space representing Oscar Schindler's office. Talking to one of the curators, I learned that the cracking floorboards had come as a surprise to the exhibition designers. They also drowned the sound of an engine inside an art installation presenting the enamelware produced in the factory. By the time that I had finished writing this article, the floorboards had been silenced.<sup>14</sup>

I have argued that in the sentimental education employed by museums historical knowledge is imparted through diegetic sounds – sounds that are intimately linked to the exhibits. In all of the examples given above, the exhibition and the sounds are used in tandem to construct a representation of the past: the Museum of the Warsaw Rising uses original weapons, but also a reconstructed cemetery and bunker in order to represent the city during the Uprising; POLIN recreates inter alia a library, a market square and a wedding procession. However, these representations are never full dioramas. They are broken through by museum texts, glass cases or multimedia elements that underline their exhibitionary character. In the case of soundscapes such a break does not take place as clearly. Although the volume, as observed above, is not always fully accurate, and although some, now obsolete, sounds might be missing from them, the museums have gone to great lengths to recreate soundscapes from the past. Nor is the difference between original sound documents and reproduced sounds made clear. For films, Michael Chion (1994: 34) has observed that 'sound, much more than the image, can become an insidious means of affective and semantic manipulation'. We will look at affective manipulation more in detail in the next section of this article. As for semantic manipulation, Chion observes that 'sound has an influence on perception ... it interprets the meaning of an image, and makes us see in the image what we would not otherwise see, or would see differently' (1994: 34). Often, it is only through sounds that we perceive a continuity in the images; sounds make unrelated images seem part of a cohesive entity and mask cuts. Similarly, in the exhibitions, sounds induce a feeling of immersion by creating an 'atmosphere' of historic time that masks breaks in visual representation. This immersion is intensified by the fact that technical gear necessary for sound reproduction remains hidden – unless visitors really look for it. Supposedly coming from everywhere and nowhere, a sonic representation of a past space and time plunges visitors into the exhibit.

### **Affect and Memory**

If volume, spatialization and techniques of authentication are used in order to construct sensory historical knowledge, scholars of immersion generally agree that the feeling of immersion involves emotional engagement. Thus, Oliver Grau observes that 'immersion is characterized by diminishing critical distance to what is shown and increasing emotional involvement in what is happening' (2003: 13). In museum soundscapes, the affective side of sentimental education is strongest where the most difficult parts of history are represented. Here, the museums generally leave phonorealist diegetic soundscapes and move to a more abstract level, consisting of body sounds, ambient music and silence.

### **Body Sounds**

The most compelling sound at the Museum of the Warsaw Rising is the heartbeat emanating from the monument named above. The heartbeat – a deep, muffled sound – can be heard in almost every part of the exhibition. The text reads: 'The heart of the museum beats for those who fought and perished – and for those who survived. It is a symbol of our remembrance



and a tribute to the Warsaw Rising and those who participated in it.' At POLIN, the exhibition chapter on deportation is accompanied by an intentionally ambiguous sound that reminds one of the scratching of closing train doors, but also of heavy breathing.<sup>15</sup>

A beating heart and breathing are not just any kind of bodily sounds. They are the sounds of life. They are also the sounds of silence: in a room deprived of all ambient sound our beating heart and our breath are the sounds heard most acutely (Blessner & Slater 2007: 18). They are additionally private and intimate sounds: we need to get close to other persons to hear their heartbeats or their breath. Finally, they are the sounds of fear or excitement: our heart starts to race when we are afraid or excited, just as we start to breathe more quickly and heavily. In movies or computer games, an accelerating heartbeat or heavy breathing typically signify danger, fear or sexual arousal.

The sound of the heartbeat at the Museum of the Warsaw Rising and the sound of breathing at POLIN throw visitors back on themselves, while at the same time intimately engaging them with another invisible and unknown person – the historical subject. Bryoni Trezise (2014: 9), analyzing the performance of feeling in memory cultures, has defined the concept of 'memory affect': 'a quality of reminiscence that invokes a feeling of embodied recall that does not locate prior experience at its basis'. The concept of 'memory affect' captures the idea that it is possible for some bodies – for example those of museum visitors – to feel other bodies – generally those of the victims – to the point where they come to 'recall' their pain without having experienced it themselves. From Sara Ahmed (2014: 6-8), Trezise borrows the concept of 'impressions', which emphasizes that our emotions are generated through affective contact with other objects – either in the past or in the present. Both Ahmed (2014: 7) and Trezise (2014: 4), using visual tropes and primarily referring to the sense of touch, speak of marks left on the skin.

One can also be 'touched' and 'impressed' by sound. In fact, biologically speaking, the process of hearing a sound is set in motion at the moment when sound waves leave an impression on the so-called tympanic membrane or eardrum (Goldstein 2007: 241). Like touch, those impressions are closely linked to emotions. Neuropsychological studies argue that while we use our sense of vision primarily for orientation and the identification of objects, we use our sense of hearing for the communication of information and emotions (Kaernbach 2006: 138). What is more, people seem to react in a preferential way to sounds created by the body, such as the human voice, but also yawning, laughing, or hammering and drilling (Arnott & Alain 2014: 90). Through the use of body sounds, the curators of POLIN and the Museum of the Warsaw Rising catch visitors' attention by drawing it to the sensations of somebody else so that memory affect becomes possible.

Memory affect is, for Trezise, linked to a sense of moral duty to feel the suffering of others (Trezise 2014: 4; cf. Jureit & Schneider 2010; Arnold-de Simine 2013). Such a feeling is generally referred to as 'empathy'. Silke Arnold-de Simine (2013: 123) has observed that 'empathy relies on the recognition of feelings in another person – feelings I know through having experienced them myself – and this transfer is made on the basis that I presume this person is and feels like myself'. Sara Ahmed has therefore defined empathy as a "wish feeling", in which subjects "feel" something other than what another feels in the very moment of imagining they could feel what another feels' (Ahmed 2014: 30, cited in Trezise 2014: 16). In other words, in imagining we experience somebody else's feelings, we always only feel ourselves. However, those feelings are generally triggered by the emotions of another person that have left an 'impression' on us. Thus, I might feel sad because I see and/or hear another person crying, and I might feel happy because I see and/or hear another person smiling.

Alison Landsberg defines 'prosthetic memory', which is put on like a prosthesis by people who have not experienced the events that are remembered. By making people experience somebody else's feelings, prosthetic memory makes 'possible a grounded, non-essentialist, nonidentity politics based on a recognition of difference and achieved through "strategic remembering"' (Landsberg 2004: 152). The museums clearly wish for such an identification. Both the beating heart and the breathing sound induce at the very least a feeling of unease in the visitors. At the Museum of the Warsaw Rising, it is at times difficult to make out where the sound comes from – is it our own heartbeat or that of another person? Its muffled sound can also be felt physically, going right through one's body – something that Landsberg defines

as the 'aural visceral' (2010: 541). In this sense, the heartbeat might work as a prototype for 'prosthetic memory'. It makes us feel close to another to the point where it may become difficult to distinguish between that person's sensations and our own.

The problem with empathy is that it will never be more than a 'wish feeling'. With the sound of the heartbeat and heavy breathing, the museums represent fear through basic somatic reactions. In this way, they induce an identification with the suffering of others that is based on an idea of emotions as anthropological constants: through the sounds of bodily reactions to fear and excitement that any visitor will have experienced, the suffering of the victims of deportation and the Warsaw Rising is presented as hearable, feelable, and therefore understandable.

Several scholars have indicated that an overemphasis on empathy and the accompanying belief that all feelings can be understood might be problematic. Trezise (2014: 41) and Jureit and Schneider (2010) observe that identification with victims precludes identification with other actors such as perpetrators or bystanders and might thus prevent a full understanding of injustice. Arnold-de Simine (2013: 123), going one step further, argues that empathy, 'does not help to understand that people in a very different historical or cultural context from my own might have very different experiences and that these experiences depend on the way they are treated due to their sex, class or "race"'. Over-emphasis on empathy could even lead to what she calls (2013: 59, 63ff) 'dark nostalgia' or 'traumatic nostalgia' – the longing to have lived through the suffering of others. Naturally, the precondition for such a 'dark nostalgia' is a safe temporal distance from the longed-for events and the certitude that they will remain alien to one's own experiences. In this sense, prosthetic memory – the adoption of the suffering of others – might not necessarily lead to the wished-for effect. In the end, empathy might merely be a means to reassure ourselves of our own moral impeccability (cf. Jureit & Schneider 2010; Welzer & Giesecke 2012). This is arguably what happens in the Museum of the Warsaw Rising where visitors are induced to identify with civilians and the fighters of the Polish Home Army. It is therefore necessary to observe that the sound at POLIN, unlike that at the Museum of the Warsaw Rising, only resembles breathing. Although the museum has been accurate in the reproduction of most sounds, it remains vague here. A full immersion or empathy is precluded – a point that I will return to later.

### ***The Voices of Witnesses to History***

The most compelling bodily sound is the human voice. Through the voice, we communicate and transmit messages. It is therefore the one sound that most often enters our long-term memory (Zimmermann et al. 2015: 8). The voice is, as the philosopher Mladen Dolar (2004: 204) has observed, 'a means for the ascension towards the summit of meaning, that has however ... to be dropped once we have reached that peak' (Dolar 2004: 204). In other words, the voice is a means towards a meaning but meaningless in itself.

At The Museum of the Warsaw Rising and in the exhibition *Krakow under Nazi Occupation 1939-1945*, the human voice is used extensively in audio or video testimonies. Those testimonies impart messages in the form of memories of the past and lessons for the future. I have analyzed the meanings of video testimonies in memorial museums extensively in previous studies (de Jong 2012, 2018). Here I want to go beyond the content of the testimonies and concentrate on the effects of the sound of the witnesses' voices.

Dolar argues that the voice, while being meaningless for meaning production, at the same time produces an exuberance of meaning. This exuberance can be found, inter alia, in phenomena such as intonation, alliteration, assonance or musicality. Often, the sound of the voice is considered to give access to something deeper or greater, something that cannot be grasped by the meaning of the words that are uttered alone. For video testimonies with Holocaust survivors, extra-verbal expressions such as sobs, sighs, pauses and gestures, are often considered to offer access to the 'real' meaning of the testimonies. They are considered to allow a peek at witnesses' trauma (de Jong 2018: 101f).

If the sound of the human voice carries meanings that cannot be reduced to the content of what it is uttering, then the effect of this voice is intensified if the body cannot be made out. Dolar observes that the acousmatic voice – the voice whose origin cannot be localized – has special power: 'Exactly because it cannot be localised, it seems to come from anywhere,

from everywhere, it gains a sudden omnipotence' (Dolar 2004: 211). Since the appearance of recording devices, we have become used to acousmatic voices that seemingly come from nowhere (Dolar 2004: 211). Nevertheless, we often grow nervous when we do not find the source from which a voice emanates. An exhibition section at the Museum of the Warsaw Rising recreates the sewers through which the fighters moved. Sounds of dripping water can be heard. At a certain point, the voices of former fighters of the Polish Home Army emanate. In the dark, intimate space of the reconstructed sewers the voices appear powerful. Being unable to localize them, I started moving around, irritated, looking for the speakers – a reaction I had not had to the sound of dripping water which likewise seemed to come from nowhere, but was diegetic to the sewer representation.

There is another element which gives the voices of witnesses to history a special power: those voices come from the past. By now, many of them are also voices of the dead. The recorded human voice and death have been aligned for a long time (cf. Weigel 2004). Jonathan Sterne has shown that at the beginnings of sound recording, the recorded voice was considered to always already be coming from the realm of the dead (Sterne 2003: 287ff). At the turn of the nineteenth century large collections of recordings were set up to preserve the sound of the voices (Felderer 2004: 15; Sterne 2003: 287-333). The content of the words was often secondary. The audio and video testimony collections, recorded approximately a century after the invention of the phonograph, can be seen as a continuation of this endeavour – this time with a concentration on meaning rather than the sound of the voice. However, while the aim is to record the memories of people who have experienced extraordinary events, something else is recorded as well: the witnesses use words and expressions that are disappearing. Their stories of expulsion and migration can often be heard in the accents with which they speak. Words from languages little used today, like Yiddish, enter their speech, and they use dialects and intonations that are disappearing. The voices of witnesses appear to be here and at the same time not quite here anymore: they exemplify the passage of time while at the same time freezing it. They are diegetic to the exhibition chapters – and at the same time they are not. It is exactly from this position of in-betweenness that their power stems. At the Museum of the Warsaw Rising, visitors can listen to testimonies through old-fashioned telephones. Next to each telephone, a picture of the witness speaking is affixed. The museum marks pictures of witnesses who have passed away with black ribbons. Listening to the voices of those witnesses, often in poor quality recordings, is reminiscent of turn of the century necromancy and the otherworldliness with which the first sound recordings were associated. It is almost uncanny.

### **Ambient Music**

Music can be a means towards an authentic representation of the past, as in the example of the wedding procession or the café in POLIN. Music is also a powerful means to induce feelings. Brain imaging research has shown that when listening to 'emotional' music, the limbic and paralimbic systems are modulated. While 'fast tempo and major chords [are] categorized as "happy"', 'slow tempo and minor chords' count as 'sad' (Arnott & Alain 2014: 90). Interestingly, there might be a close connection between memory and emotions here as the limbic and paralimbic systems 'are thought to play a central role in determining a person's emotional state' (Arnott & Alain 2014: 90-91). Especially important to this effect is the amygdala which is 'important for tagging particular memory events with an emotional valence' (Arnott & Alain 2014: 91). Thus, 'while happy music can decrease amygdala activity, sad music is particularly effective at increasing the activation, possibly because it conjures up distressing memories' (Arnott & Alain 2014: 91).

Even before music was studied from a neurological perspective, the idea that ambient music could influence people's moods had been applied by the Muzak Corporation, beginning in 1922. Muzak, the inventor of background music for public spaces, used ambient music to increase productivity among employees or stimulate buying among consumers until its bankruptcy in 2009 (Lanza 2004: 27; Neizert 2013). In the museums a similar effect is aimed at by strategically placing different types of music. The tavern music was uplifting after the slow-paced, low, gloomy music in the exhibition section on the Cossacks' attack. However, the emotional effect of music is most poignant in those exhibition sections where non-diegetic

ambient music is used. Thus, the very first reproduced sound that visitors to POLIN hear is soothing minimalist music combined with forest sounds. It is supposed to represent the myth of the arrival of the first Jews to Poland. The First World War is represented by an upbeat dramatic score reminiscent of film music. In the exhibition *Krakow under Nazi Occupation 1939-1945*, grave, slow-paced organ music is played in the final room, the Hall of Choices. The room serves as a hall of remembrance for the Righteous Amongst the Nations from Krakow, who are here contrasted with examples of negative behaviours. The aim of the hall is to make visitors reflect on those choices – and by extension their own actions (Bednarek 2011: 51-55).

In a review of POLIN, Ruth Leiserowitz<sup>16</sup> (2014) observes that the museum uses ‘cleverly arranged and technically brilliant sound elements, that subtly affect the visitors’. This sounds like a comment on Muzak. Visitor studies on the effects of soundscapes on visitors’ moods are still missing. Even Robert D. Jakubowski (2011), who has studied the impact of different soundscapes on visitors’ dwell time and the restorative outcomes of their visits to an art museum and a natural history museum, did not consider the soundscapes’ impact on visitors’ emotional engagement. However, if music affects listeners, as neurological studies argue, then it is probable that the mood that music puts visitors in influences how they encode information from the exhibition. If ‘sad’ music conjures up distressing memories, then museums throw their visitors back on themselves in sections with this music. As with body sounds, a mirror effect is created in which visitors, remembering their own sadness, are invited to feel for and with the victims.

### *The Sound of Silence*

At POLIN, the so-called ‘Final Solution’ is represented through a corridor made of rusted steel that brings to mind a train carriage, but also, possibly, a gas chamber. In contrast to other sections, no soundscape has been put in place. The only sound is of visitors walking on the steel floor. Planned, but not realized, was a ‘metaphysical break’. On exiting the rusted steel corridor, visitors were to enter a pure white space so silent that not even their words could be heard, an effect that was to be achieved by sound-muffling technology. It was never put in place because of emergency exit requirements.<sup>17</sup>

Silence is a recurring theme in acts of commemoration. The most symptomatic use of silence as a symbol for commemoration are minutes of silence, the first of which was practiced on Armistice Day (11<sup>th</sup> of November) 1919 in the United Kingdom (cf. Gregory 1994). Minutes of silence are now common practice for commemorations of the Holocaust and the Second World War and find their most impressive expression on Holocaust Remembrance Day in Israel when, cued by a siren, the whole country drops silent for two minutes (cf. Brown 2015).

This idea that silence can be a powerful ritual has precedents in religious worship. Sir Percy Fitzpatrick, who initiated the first minute of silence, compared the silent city to the ‘moving, awe-inspiring silence of a great cathedral’ (cited in Gregory 1994: 9). Peter Burke, in his short cultural history of silence, lists ‘silence of respect’, before the dead, before a monarch, but especially before God (Burke 1993: 125f). Religious silence, observes Burke, is an expression of knowledge about the limits of words. The silence in the steel corridor repeats the ritual of minutes of silence. It also repeats the respectful religious silence. Like the cathedral, the architecture of the dimly lit narrow steel corridor urges visitors to stay quiet. As in religious services, this silence expresses knowledge of the limits of words.

In Holocaust discourse, silence also expresses the unrepresentability of Holocaust memory. As already alluded to with regards to the vague sound of breathing, the curators of POLIN took a very discreet approach to ambient sound installation in the section on the Holocaust to avoid the impression of ‘sound effects’ and gratuitous theatricality.<sup>18</sup> Paradoxically, the decision to remain silent becomes a form of representation itself. The rusted corridor stands out exactly because it is almost the only space in the exhibition that is left silent.

The crux with silence is, that it is only ever silent in comparison to other situations. Silence is never completely silent. It can even be very noisy. ‘Try as hard as we may to make a silence, we cannot’, observed composer John Cage (in Fallon 2015: 159). Cage demonstrated this absence of silence with his piece 4’33”, which involves a pianist **not** playing the piano. Like the concert hall that served as a setting for Cage’s piece, the steel corridor in POLIN is noisy;

walking through it, visitors hear their own and others' footsteps. As in Cage's 4'33", they are forced to listen to the sounds of silence. Analyzing the social technologies of minutes of silence, Steven D. Brown (2012: 247) has observed that 'what public silence displays intensely is the immediate interactional order in which we are embedded, and something about the relative ability of those around us to comport themselves with the proper respect.' In the steel corridor, visitors hear amplified body sounds in restraint. In this sense, the steel construction, like body sounds and ambient music, induces introspection through external sounds.

## Conclusion

In the museums analyzed here, sounds – and to a lesser extent silence – offer a sentimental education through sonic immersion. On the one hand, diegetic sounds, sounds that directly represent what is shown in an exhibition chapter, serve to give visitors an idea of what the past has sounded like and, at the same time, to make them temporarily feel as if they were part of that past. On the other hand, non-diegetic sounds, sounds that add an interpretative level to the exhibition section, invite them to engage emotionally with and evaluate this past. Music and body sounds inducing feelings of sadness and empathy can thereby work in a closed circuit, making visitors feel somebody else's pain by throwing them back on themselves. This serves cultural memory in the form of an emphatic identification. However, it also precludes a deeper engagement with the time and the reasons for suffering.

While mostly having been treated separately so far, diegetic and non-diegetic sounds work together in many exhibition sections. In the section on the Cossack attack at POLIN, gloomy music **and** the rattling of swords, together with the cracking of burning houses and whinnying horses, can be heard. Diegetic and non-diegetic sounds also typically bleed into each other, so that the visitor moves from the part of sentimental education focused on imparting historical knowledge to the more affective one and vice versa. There is, moreover, an affective side to most diegetic sounds. Thus, the sound of birds and the chatter of a market square are more pleasant than sounds of shooting or a busy street. In this sense, while reproductive techniques, volume and spatialization might serve as tools for authentication when recreating past soundscapes and acoustic communities, the choice of which soundscapes and communities to recreate influences the way in which visitors receive certain exhibition sections. The acoustic message of the Museum of the Warsaw Rising would, for example, be very different if the uplifting songs of the Polish home army could not be heard. Visitors might be less likely to identify with the fighters and their enthusiasm, and more prone only to identify with civilian victims.

Scholars of sound are quick to observe that, while we can close our eyes, 'we have no earlids' (Schafer 2003: 25). For museums this means that while visitors can easily bypass objects, only fleetingly look at them or not read museum texts, they cannot decide to ignore soundscapes. They cannot decide to be unaffected by them.

Sounds are clearly a powerful if subtle means to influence visitors' state of mind and responses to exhibits. This becomes especially relevant where soundscapes have an effect on visitor's emotions. At the moment however, a deep reflection on the uses of sounds – both from practitioners and from theoreticians – is still largely missing. Sounds are a relatively new phenomenon in museums and they are mostly used as an add-on rather than as an important part of exhibition planning. Despite a movement within museum didactics towards self-reflection, generally neither the origin of sounds, nor the way in which soundscapes are produced is disclosed to the visitors. A sentimental education through sounds can be beneficial as it adds a further layer to museum didactics. Museums should use this layer fruitfully by teaching visitors how to listen to sound documents, for example, just as they teach them how to look at objects; or by reflecting on how researchers go about recreating past soundscapes. After roughly two centuries of having been schools of seeing, museums could now become schools of listening.

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## Notes

- 1 Unless otherwise noted, all translations from German are by the author.
- 2 Andrea Witcomb (2015: 322), in an article on affect and emotions in the 'First Peoples' exhibition of the Melbourne Museum uses the concept of 'pedagogy of feeling' to describe 'the ways in which some forms of contemporary exhibition practices stage affective encounters between viewer and viewed through the ways in which they use a range of devices to promote sensory experiences that encourage introspective reflection on the part of visitors'. I prefer the concept of 'sentimental education' because of the double meaning. Although the education that I refer to happens through sensory experiences, those sensory experiences are not always meant to lead to an emotional engagement with the represented. As shown in the first part of this paper, they are sometimes used primarily to impart historical knowledge.
- 3 Barbara Kirshenblatt-Gimblett, chief curator of the core exhibition at Polin, interview by author, 05 March 2015.
- 4 Olga Szlachcic, designer at Sonica, responsible for the soundscapes at Polin, interview by author, 05 March 2015.
- 5 Fencott, C. (1999) 'Presence and the Content of Virtual Environments': <http://web.onyxnet.co.uk/Fencott-onyxnet.co.uk/pres99/pres99.htm>
- 6 Fencott, C. (1999) 'Presence and the Content of Virtual Environments': <http://web.onyxnet.co.uk/Fencott-onyxnet.co.uk/pres99/pres99.htm>
- 7 Barbara Kirshenblatt-Gimblett, interview by author, 05 March 2015.
- 8 Barbara Kirshenblatt-Gimblett, interview by author, 05 March 2015. .
- 9 Joshua Waletzky, filmmaker and musician, expert on Yiddish music, Skype interview by author, 15 April 2015.
- 10 Olga Szlachcic, interview by author, 05 March 2015.
- 11 Olga Szlachcic, interview by author, 05 March 2015.
- 12 Ania Grzechnik, conservator at the Warsaw Rising Museum, interview by author, 04 March 2015.
- 13 Barbara Kirshenblatt-Gimblett, interview by author, 05 March 2015.
- 14 Monika Bednarek, custodian and manager of Oskar Schindler's Enamel Factory, branch of the Historical Museum of the City of Krakow, interview by author, 02 March 2015.
- 15 Barbara Kirshenblatt-Gimblett, interview by author, 05 March 2015; Olga Szlachcic, interview by author, 05 March 2015.
- 16 Leiserowitz, R. (2014) POLIN. Museum der Geschichte der polnischen Juden, H-Soz-u-Kult: <http://www.hsozkult.de/exhibitionreview/id/rezausstellungen-210?title=polin-museum-der-geschichte-der-polnischen-juden&recno=1&q=Polin%20&fq=&sort=newestPublished&total=1>
- 17 Barbara Kirshenblatt-Gimblett, interview by author, 05 March 2015; Olga Szlachcic, interview, 05 March 2015.
- 18 Barbara Kirshenblatt-Gimblett, interview author, 05 March 2015.

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