

---

Dumisani Moyo, Kundai Moyo

## Power, Endurance and the Significance of Radio Voice in Africa in the Age of Rapid Technological Change

*Abstract: Seit seinem Aufkommen im frühen 20. Jahrhundert hat das Radio Gesellschaften weltweit auf vielfältige Weise beeinflusst – politisch, kulturell und wirtschaftlich. Im Zuge dessen verdiente es sich zahlreiche Beinamen, die seine Rolle in der jeweiligen Gesellschaft definieren: Es wurde als „Medium par excellence“, „Theater des Geistes“, „Universität des Volkes“ und „Medium des Volkes“ bezeichnet. Als Medium, das primär über Stimme funktioniert, darf seine Bedeutung im sozialen und politischen Leben nicht unterschätzt werden. Immer schon wurde das Radio deshalb von denen, die es besaßen und kontrollierten, instrumentalisiert – im Guten wie im Schlechten. In Afrika war es zunächst die Stimme der Herrschaft und Unterdrückung, später die Stimme des Widerstands und der Befreiung. Weil es die Menschen auch in weit entfernten Gebieten erreicht, die für andere Medien nicht leicht zugänglich sind, und weil es Hürden von Alphabetisierung und linguistischer Vielfalt überwindet, ist es das effizienteste und effektivste Medium in Ländern mit großer ländlicher Bevölkerung, die mit Armut, Analphabetismus und Ausgrenzung zu kämpfen hat. Auch deshalb wurde es als „Afrikas Medium“ bezeichnet. Der vorliegende Text liefert einen Überblick zu Resilienz, Anpassungsfähigkeit und Kontinuität des Radios in Afrika über die Jahre hinweg und diskutiert die zentrale Bedeutung von „Stimme“ für eine afrikanische Perspektive auf die Technologie Radio. Darüber hinaus wird kritisch analysiert, wie das Radio auf das Zeitalter der künstlichen Intelligenz, des maschinellen Lernens und der Algorithmen reagiert und welche Auswirkungen diese Änderungen haben. Es wird argumentiert, dass die schnellen technologischen Veränderungen für das Radio, wie wir es kennen, Chance und Gefahr zugleich sind.*

*Abstract: Since its advent in the early 20<sup>th</sup> century, radio has influenced societies in many ways across the world – politically, culturally and economically. In the process, radio has earned itself many epithets that define what it has meant to these societies: It has been called ‘the medium par excellence,’ ‘theatre of the mind,’ ‘the people’s university,’ ‘the people’s medium’ – and many such complimentary names. As a medium that has come to be associated with voice, its role in social and political life cannot be ignored. Depending on who owned and controlled it,*

*radio has been instrumentalised – for the good and bad. In Africa, it has a history of serving first as the voice of domination and oppression, then later as one of resistance and liberation. Its ability to reach communities in far-flung areas that are not easily accessed by other media, and to circumvent barriers of literacy and linguistic diversity has meant that it is the most efficient and effective medium for countries with large rural populations afflicted by challenges of poverty, illiteracy and exclusion. For this and many other reasons, it has been called ‘Africa’s medium.’ This text provides an overview of the nature of radio’s endurance, adaptability and continuity in Africa over the years and interrogates the centrality and significance of ‘voice’ in the African conceptualisation of the technology of radio. Further, it critically analyses how radio is responding to the current age of artificial intelligence, machine learning and algorithms, and the implications of these changes. It argues that these rapid technological changes pose both threats and opportunities for radio as we know it.*

## 1 Introduction

While in some instances radio has been referred to as ‘a dying medium,’ or ‘the forgotten medium,’ several scholars have demonstrated that it is a resilient medium that continues to defy its naysayers, especially those who saw the coming of newer technologies such as television and the internet as heralding its death. As Matelski (1995, p. 5) argues, radio has “a tradition of survival and renewal” and “is accustomed to being dismissed as dead in a modern media world dominated by images, where the visual seems to mute the aural.” With the advent of artificial intelligence (AI) and automation in recent years, newer questions have been raised about the future of radio as a voice technology. AI, which in simple terms refers to the creation of intelligent technology capable of carrying out tasks with intelligence approximating that of humans, and to solve complex problems (Zanni & Aziz 2018), has been deployed in many sectors including radio broadcasting over the past few years – simultaneously evoking both excitement and anxiety. While it eases the execution of some repetitive tasks which are now assigned to machines, this has raised ethical dilemmas and concerns related to job losses and lack of empathy, among others. This text critically discusses the significance of voice in African radio broadcasting, and how this has been affected by the rise in artificial intelligence.

## **2 A Brief Overview of Research on Radio in Africa**

Approaches to the study of broadcasting in Africa have been varied, but many studies have focused on structure and content, looking at issues of regulation (largely using the political economy lens to discuss ownership, control and distribution in an industry that for many years was characterised by state ownership and control) and content (examining programming and how audiences engage with various programmes from a cultural studies perspective) (Fardon & Furniss 2000; Gunner et al. 2012). Other studies have also looked at the history of the medium on the continent, at the encounter between modern technology and traditional society (Fraenkel 1959). The common themes include the role of radio in development, community mobilisation/engagement, democracy building, and how radio has navigated technological change – with the coming of the internet and digitisation (Manyozo 2009; Nassanga et al. 2013).

The ‘liberalisation of the airwaves’ in the 1990s brought about renewed excitement about the potential of radio both for democratisation and development, especially in Africa and other parts of the developing world (Jallov 2012; Manyozo 2012). This allowed a decentralisation of radio in unprecedented ways, enabling communities to own stations where they could freely discuss matters of concern to them as well as engage with information from the outside world. These new radios took a variety of forms, and enabled communities to organise themselves around them in different ways. The case of radio listening clubs in Zambia and Malawi is an interesting one, as it not only gave people a voice but also the power to question authorities and demand responses in ways they could never do before (Banda 2007; Manda 2015).

The liberalisation wave also saw the mushrooming of commercial radio stations in many countries, with an increased uptake of the talk radio format that also transformed radio from a predominantly top-down medium to a more participatory and people-centred medium. Despite all this ‘opening up’, politics has never been far away from radio broadcasting in Africa. In many instances, the licensing was fraught with cronyism and corruption, and in others, pseudo-liberalisation ensued as power elites recognised the strong link between control of radio and their stay in power.

## **3 Theorising Voice, Power and Radio in Africa**

The concept of voice has hardly been theorised in African studies on radio. Central to the phenomenon of radio broadcasting, however, has always been a fascination

with the 'disembodied voice' that can travel across vast distances and is present or heard in various spaces at the same time through wireless boxes, and more recently through various forms of digital devices. Beyond that, the association of voice with power and agency has been almost universal across cultures, where acts of 'voicing' and 'giving voice' are considered essential for political participation and democratic life. Weidman's concept of "ideologies of voice" helps in seeing voice from multiple perspectives centred around the power and agency of those who have the voice to speak, those who are given voice, as well as those who listen and how they interpret and engage with the received voice:

Ideologies of voice can be characterized as culturally constructed ideas about the voice, including theories of the relationship between vocal quality and character, gender, or other social categories; where the voice comes from; its status in relation to writing and recorded sound; the relationship between the voice and the body; what constitutes a "natural" voice; and who should be allowed to speak and how [...] Ideologies of voice determine how and where we locate subjectivity and agency (Weidman 2014, p. 49).

This suggests that voice cannot be taken as neutral or value-free, because originators of voice are culturally located individuals who give voice from specific ideological positions, hence the need to appreciate "the complexities of how voices are actually constructed, mediated, and heard" (ibid). In African cultures, where belief in spirituality is almost universal, the idea of radio's disembodied voice has evoked imaginations that associate radio broadcasting with ghostly occurrences (Englund 2015; Fraenkel 1959) or the presence/absence phenomenon of spirit mediums (Moyo & Chinaka 2020). By extension, this bequeathed supernatural powers and to some degree uncontested authority to the "unseen voice of radio,"<sup>1</sup> just as the voice of ancestral spirits carried the sacred power and authority of the departed who continued to live among their communities in the spirit and would often manifest themselves through spirit mediums.<sup>2</sup> What the technology of radio broadcasting therefore did was to extend already existing African beliefs in spirituality by, in Durham Peters' words, "claiming to burst the bonds of distance and death" (1999, p. 142). Drawing links between the 'out-of-body communication' that happens in both electronic communication and the spiritual world, Peters argues:

The word, voice, or image of a person dead or distant channelling through a delicate medium: this is the project common to electronic media and spiritualist communication. Indeed, all mediated communication is in a sense communication with the dead, insofar as media can store "phantasms of the living" for playback after bodily death. (ibid)

African communities were immediately able to use existing cultural lenses to relate to the new technology of radio and deploy it in relatable ways for social, cultural and political ends. Englund's study of two phenomenal Zambian broadcasters, "Gogo Breeze" (Peter Grayson Nyozani Mwale) and "Gogo Juli" (Julius Chongo), for instance, points to how a combination of radio voice authority with the moral authority that comes with being an elder in society contributed immensely to the success and effectiveness of these broadcasters.<sup>3</sup> Englund's idea of "radio grandfathers" therefore connects well with the spiritual realm with which early radio broadcasting has been associated (Moyo & Chinaka 2020), as the elderly (often seen as 'living ancestors') are seen as not so distant from the ancestors and hence authoritative enough to dispense wisdom and guidance to society.

In the context of the Zimbabwe liberation struggle where guerrilla radio played a significant role, voice was central to advancing the cause of the freedom fighters, as evidenced by the fact that both liberation movements' broadcasting outlets had the word 'voice' in their name: *Voice of Zimbabwe*, and *Voice of the Revolution*,<sup>4</sup> suggesting that these were popular movements that spoke for the people, and that a huge part of the purpose of the struggle was to regain the voice of the majority people of Zimbabwe who were silenced and oppressed by the Rhodesian colonial regime. Radio thus enabled liberation movements to maintain a sonic presence among their supporters (Lekgoathi et al. 2020). The fact that these broadcasts were then banned inside Rhodesia and operated underground, with the act of listening to them considered subversive, contributed to the aura of sacredness with which their voice was received. The few who secretly listened to these clandestine radio stations were able to reconstruct the voice of the freedom fighters and amplify it through word of mouth – through what Stephen Ellis (1989) aptly called "pavement radio." As Weidman argues,

Voices are constructed not only by those who produce them but also by those who interpret, circulate, and reanimate them: by the communities of listeners, publics, and public spaces in which they can resonate and by the technologies of reproduction, amplification, and broadcasting that make them audible. Individual voices are created, in this sense, by audiences, fans, critics, cultural commentators and by the larger spirit of their times (Weidman 2014, p. 49).

Moyo and Chinaka extend this view by arguing that the spirit mediums can be viewed in the Foucauldian sense of "technologies of the sign system" which were "influential in framing discourses that informed and shaped the resistance to colonial occupation" (2020, p. 87). By extension and linking up with Walter Ong's (1982) concept of the "technologizing of the word," the voice as a carrier of the

word is essentially a technology of empowerment. The idea of empowerment itself has been critically important to most African communities, who have suffered disempowerment both during the colonial and post-colonial eras. What Mamdani (1996) conceived as “citizens” and “subjects” in the two historical eras sums up the dichotomy between those who have the power to voice, and those who are powerless and hence voiceless.

## 4 Radio in the Age of Artificial Intelligence

As previously mentioned, radio broadcasting has not been immune to the rapid technological change in recent years, including the growth in artificial intelligence and automation that has impacted many sectors. The deployment of artificial intelligence has been met with mixed reactions, not least because of the wide-ranging implications of replacing humans with machines. In radio broadcasting, the introduction of podcasting, voice assistants and audio streaming has brought both benefits and challenges to a sector that had traditionally been characterised by human interaction and the personal voice/touch. Indications are that in the media sector, AI has mostly been deployed in content recommendations and personalised entertainment, workflow automation and commercial optimisation through targeting and dynamic pricing (Chan-Olmsted 2019). While a report by Zanni and Aziz (2018) observed that the deployment of artificial intelligence in the area of broadcast and media was still at the start of its adoption curve, it is important to highlight that technological change in recent years has been characterised by accelerated speed, which means the picture presented in 2018 would be vastly different from that in 2021. In fact, the same report indicates that the percentage of companies saying they were unlikely to adopt AI within the next 2-3 years dropped from 57% to 36% within six months of the study, while those who said they had already adopted AI rose from 5% to 8% within the same period as awareness of the benefits of AI increased. The major areas where AI has been deployed most in broadcasting, according to that report, are content management (40%) and content distribution (35%). These are areas that entail routine and repetitive tasks that are better performed by automation, such as metadata tagging and indexing (which enables end-users to develop granular databases of their content and hence make it easier to monetise), image recognition, speech-to-text, etc. With the predictive capacity of machine learning and AI, radio broadcasters can understand the preferences and behaviour of their listeners and hence seek to produce content that appeals to them.

Whilst some of these technological advancements have not yet been widely integrated in African radio broadcasting, it is evident that AI holds promise for radio on the

continent, where market segmentation, building audience profiles and enhancing targeted advertising can become a lot easier. As Chan-Olmsted points out, “AI can be used to integrate audience and content insights, matching audience interest and relevant content in real time to deliver personalised content and better consumption experience” (Chan-Olmsted 2019, p. 193). This would also allow stations in different provinces to advertise products specific to their local listeners as opposed to the traditional system of indiscriminate advertising to all. In addition, AI could be used more in scripted programs that can be easily automated to reduce the need for human intervention, which could be beneficial for instance during a global pandemic where individuals under lockdown are encouraged to work from home.

In Uganda, as in many other countries on the continent, radio remains the primary source of information for most citizens and acts as a vital platform for communication. The explosion in community radio stations has therefore enabled many to participate in discussions on important community issues such as access to education, gender-based violence, floods induced by climate change, malaria and cholera, refugees or local disasters (Al-hassan et al. 2011; Rosenthal 2019). In 2019, the United Nations partnered with academics, policy makers and Pulse Lab Kampala, the Ugandan branch of the United Nations’ Global Pulse Labs, to develop an automated speech recognition tool which uses AI technology to scan multiple radio broadcasts and aggregate information according to selected themes. This enables decision-makers to access the voices of marginalised communities and get a better appreciation of society’s challenges and hence find more suitable ways of assisting them.

As communications technologies change over time, so do power dynamics between senders and receivers, and between those with the voice and power to generate messages and their readers/listeners/audiences. Invariably, these changes have led to a flattening of the hierarchy of communication, as those at the receiving end gain more and more power to ‘talk back’ and be producers of their own messages. However, these gains have not been permanent, as elites have continued to find new ways of manipulating these new technologies to take back the power that had accrued to those in the margins. The same technology which is being used for the good of society in Uganda, for instance, can be easily turned into a tool for repression, to monitor any dissenting voices on different community and commercial radio stations. With radio being the medium that reaches the largest numbers of African populations, there has always been strong interest in manipulating radio voice for political gain, and this interest will certainly increase and become more sophisticated as AI enables enhanced precision in understanding audiences and their preferences.

While uptake of technology in Africa may be generally slow, recent history has shown that with new information and communications technologies such as mobile phones, African communities have been in the forefront of appropriating these to leapfrog into the future (Nyamnjoh 2005). At the same time, many African governments have shown a strong penchant to invest in technologies that aid their stay in power. Many have acquired surveillance technologies from China, where AI and social media are increasingly used for micro-targeting, particularly during elections. In some of these elections, manipulation of images, videos and text messages to discredit opponents and spread falsehoods and disinformation during campaigns has been rife. As AI improves and robots perfect the imitation of voice, radio will, if not properly regulated, become the new battleground in the fight between bots and humans in future election campaigning. In countries such as Kenya, Uganda, and Zimbabwe, governments and opposition parties alike have already invested in bots and human agents to subvert the will of the people (Mare et al. 2019; Moyo et al. 2020).

However, while online radios have changed the culture of consuming radio in many parts of the world, where platforms such as Apple Music and Spotify have become popular especially among youths, traditional radio has remained the mainstay in most of Africa, where access to data continues to be highly uneven. While these advancements in artificial intelligence give promise to struggling broadcast companies that are looking out for new solutions and more reliable revenue streams, the recent Covid-19 pandemic has demonstrated just how much people crave human contact rather than artificial/robotic contact. As iHeartMedia's Brian Kaminsky argues,

creating content for the radio comes down to creating an experience that builds a connection with listeners and keeps them entertained, informed and eager to come back for more. AI should be used in a responsible way whilst maintaining and enhancing the human elements.<sup>5</sup>

Thus, despite the rise of voice automation and advancements in emotional AI, the power of the human voice in radio remains unmatched in the face of these new developments. As Englund argues, "radio affords a peculiar form of public intimacy by broadcasting actual voices that generate sentiments in their listeners" (Englund 2015, p. 253).



## 5 Conclusion

Whilst advancements in AI and machine learning could be seen as posing a threat to radio broadcasters in Africa, we argue that it is too early to tell, considering its current rate of adoption. This slow pace of adoption is partly informed by a recognition that the integration of AI needs to be beneficial to all and incorporated in an ethical manner. Domestication and customisation of AI through the incorporation of local languages in ways that do not discriminate, alienate and marginalise users in the global South would be essential. As radio evolves in the age of AI, it is arguable that the human touch and the human voice will remain an indispensable part of broadcasting, and that broadcasters will continue to reimagine and adapt their roles in a world where people crave human-to-human engagement as opposed to robotic contact. Several programmes in African radio stations attest to the fact that the affective power of the human voice on radio cannot be easily replaced by machines. Gogo Breeze's humour and empathy, for instance, could never be automated. It is evident, though, that AI will play a significant role in furthering radio's impact in Africa through content recommendations, enabling personalised entertainment, and commercial optimisation.

## References

- Al-hassan, Seidu; Andani, Alhassan; Abdul-Malik, Abdulai (2011): The Role of Community Radio in Livelihoods Improvement: The Case of Simli Radio. In: *Field Actions Science Reports*. 5. pp. 3-7.
- Banda, Fackson (2007): Radio Listening Clubs in Malawi and Zambia: Towards a Participatory Model of Broadcasting. In: *Communicare. Journal for Communication Sciences in Southern Africa*. 26/1. pp. 130-148.
- Carvajal, Elena S. (2020): The Radio, Getting Smarter Everyday Thanks to Artificial Intelligence. In: *Telefónica Tech*. February 13. <https://business.blogthinkbig.com/the-radio-getting-smarter-everyday-thanks-to-artificial-intelligence/> [last accessed September 09, 2021].
- Chan-Olmsted, Sylvia M. (2019): A Review of Artificial Intelligence Adoptions in the Media Industry. In: *International Journal on Media Management*. 21/3-4. pp. 193-215.
- Ellis, Stephen (1989): Tuning into Pavement Radio. In: *African Affairs*. 88/352. pp. 321-330.
- Englund, Harri E. (2015): Multivocal Morality: Narrative, Sentiment, and Zambia's Radio Grandfathers. In: *HAU: Journal of Ethnographic Theory*. 5/2. pp. 251-273.

- Fardon, Richard; Furniss, Graham (eds.) (2000): *African Broadcast Cultures: Radio in Transition*. Oxford: James Currey.
- Frankael, Pierre (1959): *Wayaleshi*. London: Weidenfeld and Nicolson.
- Gunner, Liz; Ligaga, Dina; Moyo, Dumisani (2012): *Radio in Africa: Publics, Cultures and Communities*. Johannesburg: Wits University Press.
- Gunner, Liz (2019): *Radio Soundings: South Africa and the Black Modern*. Cambridge: Cambridge University Press.
- Jallov, Birgitte (2012): *Empowerment Radio: Voices Building a Community*. Gudhjem: Empowerhouse.
- Johnson, Lesley (1988): *The Unseen Voice: A Cultural Study of Early Australian Radio*. New York: Routledge.
- Mamdani, Mahmood (1996): *Citizen and Subject: Contemporary Africa and the Legacy of Late Colonialism*. Princeton, N.J: Princeton University Press.
- Manda, Levi Z. (2015): What Makes Radio Listening Clubs a Participatory Communication for Development Platform Work? A Case Study of Monkey Bay, Malawi. In: *Online Journal of Communication and Media Technologies*. 5/4. pp. 204-219.
- Mano, Winston (2004): *Renegotiating Tradition on Radio Zimbabwe*. In: *Media, Culture & Society*. 26/3. pp. 315-336.
- Manyozo, Linje (2009): *Mobilizing Rural Community Radio in Africa*. In: *Ecquid Novi: African Journalism Studies*. 30/1. pp. 1-23.
- Manyozo, Linje (2012): *People's Radio: Communicating Change Across Africa*. Penang: Southbound.
- Mare, Admire; Mabweazara, Hayes M.; Moyo, Dumisani (2019): "Fake News" and Cyber-Propaganda in Sub-Saharan Africa: Recentering the Research Agenda. In: *African Journalism Studies*. 44/4. pp. 1-12.
- Matelski, Marilyn J. (1995): *Resilient Radio*. In: *Radio: The Forgotten Medium*. Edward C. Pease; Dennis E. Everette (eds.). New Brunswick, London: Transaction Publishers.
- Moyo, Dumisani; Chinaka, Chris (2020): *Spirit Mediums and Guerrilla Radio in the Zimbabwe War of Liberation*. In: *Guerrilla Radios in Southern Africa: Broadcasters, Technology, Propaganda Wars, and the Armed Struggle*. Sekibakiba P. Lekgoathi; Tshupo Moloji; Alda R. S. Saide (eds.). Lanham, Boulder, New York, London: Rowman & Littlefield.
- Moyo, Dumisani; Mare, Admire; Mabweazara, Hayes M. (2020): *Social Media, the Press and the Crisis of Disinformation in Africa*. In: *Communicatio: South African Journal of Communication Theory and Research*. 46/4. pp. 1-6.

- Mpofu, Philip; Salawu, Abiodun (2020): Handling of Sexually Offensive Expressions on Zimbabwe's Selected Radio Stations. In: Emerging Trends in Indigenous Language Media, Communication, Gender, and Health. Kehinde O. Oyesomi; Abiodun Salawu (eds.). Hershey, PA: IGI Global. pp. 166-187.
- Nassanga, Gorreti L.; Manyozo, Linje; Lopes, Claudia (2013): ICTs and Radio in Africa: How the Uptake of ICT Has Influenced the Newsroom Culture among Community Radio Journalists. In: Telematics and Informatics. 30/3. pp. 258-266.
- Nyamnjoh, Francis (2005): Africa's Media, Democracy and the Politics of Belonging. London: Zed Books.
- Peters, John D. (1999): Speaking into the Air: A History of the Idea of Communication. Chicago, London: University of Chicago Press.
- Rosenthal, Anne (2019): When Old Technology Meets New: How UN Global Pulse Is Using Radio and AI to Leave no Voice Behind. In: United Nations Foundation. April 18. <https://unfoundation.org/blog/post/when-old-technology-meets-new-how-un-global-pulse-is-using-radio-and-ai-to-leave-no-voice-behind/> [last accessed September 09, 2021].
- Weidman, Amanda (2014): Anthropology and Voice. In: Annual Review of Anthropology. 43/37-51. p. 49.
- Zanni, Lorenzo; Aziz, Abirah (2018): Artificial Intelligence in Broadcast and Media. In: iabm. May 8. <https://theiabm.org/ai-broadcast-media-snapshot/> [last accessed July 30, 2021].

## Notes

- <sup>1</sup> This is how the first Chairman of the Australian Broadcasting Commission, Charles Lloyd Jones, described radio voice in 1932 (as cited in Johnson 1988, p. 1).
- <sup>2</sup> In Zimbabwe, for instance, people were traditionally accustomed to the idea of elders visiting specific sacred shrines such as the Njelele shrine where they would present their pleas or grievances and 'hear' the voice of the invisible ancestors in response.
- <sup>3</sup> The idea of using the voice of an elder as a moral compass, and as someone to dispense wisdom and advice has been a critical feature of radio in Africa. Figures such as Mbuya Mlambo and Auntie Rhoda and Sekuru Nyathi played such a role in Zimbabwe (Mano 2004; Mpofu & Salawu 2020), while King Edward Masinga and Bloke Modisane were in similar roles in South Africa (Gunner 2019). This has also been a key feature of lifestyle magazines where similar figures have regular columns.
- <sup>4</sup> *Voice of the Revolution* was the broadcasting bulletin from the Zimbabwe African People's Union (ZAPU), operating from Lusaka, Zambia, while *Voice of Zimbabwe* was

the broadcasting bulletin from the Zimbabwe African National Union (ZANU), operating from Maputo, Mozambique.

- <sup>5</sup> Carvajal, Elena S. (2020): 'The Radio, getting smarter everyday thanks to artificial intelligence,' <https://business.blogthinkbig.com/the-radio-getting-smarter-everyday-thanks-to-artificial-intelligence/> [last accessed September 29, 2021].



This paper is licensed under Creative Commons “Namensnennung – Weitergabe unter gleichen Bedingungen CC-by-sa”, cf. <https://creativecommons.org/licenses/by-sa/4.0/legalcode>

---

Der vorliegende Aufsatz entstammt der Publikation

Marcus Erbe / Aycha Riffi / Wolfgang Zielinski (Hrsg.)

**Mediale Stimmwürfe**

Perspectives of Media Voice Designs

Schriftenreihe Digitale Gesellschaft NRW, Bd. 7

Kopaed Verlag, 2022

ISBN 978-3-96848-642-0

---