

Ralf Peter Reimann

Praying with Avatars

A Response to Germany's First AI Worship Service and its Theological and Anthropological Implications

Abstract

Germany's first AI-led worship service was conducted during the Protestant Church Convention (Kirchentag) in June 2023. The service featured avatars powered by ChatGPT and music generated by AI tools raising questions about the role of artificial intelligence in spiritual and ecclesiastical life. Through a detailed description of the service and a critical analysis of audience reactions, the paper examines theological, anthropological, and technological dimensions of AI-mediated religious practice. Central themes include the anthropomorphization of AI, the emotional and relational limitations of machine-led worship, and the implications of integrating AI into sacred contexts. The article also reflects on how such experimental formats can illuminate what truly matters in traditional worship services. While acknowledging both the innovative potential and current limitations of AI in religious settings, the author calls for careful, ethically grounded engagement with emerging technologies in theology and liturgy,

1. Introduction: Germany's First Artificial Intelligence Worship Service

On June 9, 2023, St. Paul Church in Fürth hosted Germany's inaugural artificial intelligence worship service, which drew significant interest from both attendees of the German Protestant Church Convention (Kirchentag) and the media. With over 400 people in atten-

dance, the church was filled to capacity. Following the service, a panel discussion¹ offered reflections on the experience.²

Theologian and AI artist Jonas Simmerlein of Vienna initiated this digital worship service project featuring AI-generated avatars positioned in front of the altar. The avatars led the roughly 45-minute service, welcoming congregants and guiding them through the liturgy, which included intercessory prayers, the recitation of psalms and the Creed, a sermon, the Lord's Prayer, and a final blessing. Artificial intelligence even composed the introductory music. The congregation interacted by reciting the Lord's Prayer, the Creed and psalms while watching a pre-produced video during the service. The Kirchentag website offers a recorded video of the service and the subsequent discussion.³

Before the event commenced, the moderator addressed the audience and requested their expectations to be submitted through a Mentimeter tool. A few selected reactions were later displayed on a screen.⁴

- The thought of such a versatile AI scares me and gives me the creeps.
- I'm looking forward to it.
- I'm curious to see how well it does.
- I'm very excited to see what it will be like and I'm looking forward to it.
- Nervous.
- Interested.
- Are we living in a Matrix?
- I'm very curious to see how meaningful the AI's interpretations of Biblical passages are.
- I'm curious to see if I can also have a beautiful service with an AI.

1 Kirchentag-Programmdatenbank, "Zentrum Digitale Kirche und Gottesdienst"; the panelists included Melitta Müller-Hansen, Anna Puzio, Ralf Peter Reimann and Jonas Simmerlein. Jürgen Pelzer moderated the discussion.

2 After the completion of this article and prior to its publication, *Simmerlein: Sacred Meets Synthetic*, appeared, offering an empirical analysis of the AI church service. Its findings could not be incorporated into the present analysis.

3 See the report on the Kirchentag website by Pischl et al.: Alexa; and watch the video recording *Alexa, starte den Gottesdienst!*

4 Ibid., 5:43.

The moderator spoke with Simmerlein, who highlighted the experimental nature of the service.⁵ Simmerlein discussed his reasons for conducting a worship service generated by artificial intelligence. He explained that his research was motivated by an academic interest in exploring the connection between AI and human spiritual practices. Simmerlein aimed to investigate whether AI has the potential to evoke bona fide spiritual and religious experiences in participants. He was particularly interested in exploring the implications of integrating advanced technologies into domains that are inherently human. This endeavor sought to illuminate the nuances of human responses—ranging from authentic spiritual resonance to ambivalence—toward religious practices mediated by artificial intelligence.

Before the service began, Simmerlein provided a summary of the technology used in the experiment. For the liturgy, he employed ChatGPT and used the following prompt: “You are serving as a pastor at Kirchentag 2023, where the guiding motto is ‘Now is the Time’.” The Pipio app⁶ was used to produce a video featuring computer-rendered humans vocalizing the content of the service. Additionally, another AI system was implemented to generate the music. All prayers, including the Lord’s Prayer, were delivered by the AI. Simmerlein encouraged attendees to actively participate and, if comfortable, to pray together with the avatars. Following the service, participants were invited to provide feedback, which would aid in a subsequent scientific analysis.

2. The Service: The Avatar Leading the Worship

The complete service is available through the reference provided for those who wish to view it.⁷ The following analysis will focus on the participants’ perspective on the worship service.⁸ Further

⁵ Ibid., 7:40.

⁶ *pipio.ai*: Create.

⁷ *Alexa, starte den Gottesdienst!*, 18:45.

⁸ Using the terminology of *Buie: Exploring Techno-Spirituality*, 2–4; the AI service can be described as a transcendent user experience, which is human-computer interaction that includes subjective spiritual and transcendent experiences. However, the transcendental dimension of this interaction will not be the focus here; instead, the emphasis will lie on how the avatar and the avatar’s interactions were

theological questions, especially regarding the pastor's role from an ecclesiological perspective—such as the significance of ordination for the officiant—are beyond the scope of this paper. We will present an English word-for-word reproduction of the opening segments of the liturgy up until the psalm reading to provide readers with a thorough understanding of it.

In the name of the Father, the Son, and the Holy Spirit.

Dear visitors to the AI worship service at the Kirchentag in Nuremberg and Fürth. I am GPT, an artificial intelligence language model developed by OpenAI. My purpose is to answer questions and provide information on various topics. I have access to a multitude of knowledge databases and can communicate in several languages. I am delighted to be a part of this special event and hope that I can contribute to making this experience unforgettable for all participants. It is a great pleasure to welcome you to this special occasion.

As we gather here in this beautiful city, I am reminded of the importance of time, how it has brought all of us to this moment, and how it shapes our experiences and interactions with one another. Time is a precious commodity that we often take for granted in our hectic lives. But let's pause for a moment and reflect on the significance of this gathering. We have come together to explore the intersection of faith and technology and to consider how we can harness the power of artificial intelligence to create a more just and balanced world.

Displayed on a screen, the avatar spoke using a computer-generated voice, with mouth movements synchronized to the speech. However, the avatar consistently gazed into the audience and did not close the eyes when praying. Only the upper part of the body was shown, so hand movements were not visible. When praying or preaching, the same body movements were used.

For all observational purposes, the avatar resembled a human being and communicated in a manner similar to that of a human. Throughout the liturgy, the recitation transitioned smoothly between four distinct avatars. Notably, traditional clerical attire was absent. Two of the avatars exhibited male characteristics, while the other two displayed female attributes. Nevertheless, a prominent green background created a studio-like ambiance.

perceived by the congregants and what can be deduced from their perceptions and on personal observations made by the author of this article.

The service started conventionally with the avatar invoking the triune God, akin to any other pastor. To the uninitiated, it may have appeared as if they were observing a pre-recorded service conducted by a human pastor in a studio. The avatar subsequently introduced themselves—or himself/herself/itself—as AI. Using a pronoun other than “it” automatically endows the avatar with human-like qualities; hence, for simplicity’s sake, the pronoun “they” will be used throughout this text.

The avatar’s pronoun selection when addressing the congregation serves to demarcate their artificial nature while also rendering them more relatable. The avatar utilized the collective term “we” when including themselves among the human congregation, as evidenced by phrases such as “our experiences and interactions with one another”. Without knowledge of the avatar’s nature, one might mistakenly perceive them as a recorded human pastor conducting the service. However, the avatar self-identifies as AI, allowing the congregation to pray with the avatar and ultimately receive their blessing.

3. Reactions to the AI Worship Service

3.1 Perceptions of the Audience

The attendees of the AI worship service expressed diverse reactions toward the use of artificial intelligence. Some found it fascinating and viewed it as an interesting experiment. They were impressed by the technical implementation and the opportunity to experience a worship service entirely created by artificially generated avatars and texts. However, critical voices predominated among the participants. Critics expressed concern about the absence of a personal touch and the empathy that they would expect from a human pastor. It was noted that AI-generated texts were perceived as emotionless, impersonal or dull. After the service, participants were then invited to discuss their perceptions of the AI-led worship service with the other participants. They were then prompted to share their insights and reflections in the Mentimeter tool. The compiled answers were subsequently exhibited on the identical display on which the avatars

had been presented during the liturgical service. This represents feedback from the attendees:⁹

- No substitute for a beautiful service with real people.
- It cannot (yet) replace humans.
- I love our liturgists here in St. Paul. Real people who reach me on Sundays.
- Never again.
- Was too fast.
- AI does not replace humans on an emotional level.
- AI is just a tool for the pastor; it cannot work on its own.
- This does not yet replace people who lead and shape a service.
- Too impersonal.
- AI needs a few more moments until it is perceived as a person. However, I see potential. Perhaps sometimes closer to colleagues than we would like.

The feedback from the congregation after the AI-led service highlighted several sentiments (e.g., with regard to human pastors, “love”, “reach me”, as well as to the AI, “too fast”, “impersonal”, no “emotional level”). Some felt that there is no replacement for the warmth and connection of a service led by real people: “This does not yet replace people who lead and shape a service”. They expressed appreciation for the familiar touch of human-led liturgies. A significant critique was the speed and impersonal nature of the AI service, with some suggesting it lacked the emotional depth humans bring. While some see potential in the integration of AI into religious ceremonies, many believe that AI, at its current stage, serves merely as a tool and cannot autonomously emulate the genuine human connection essential to such gatherings. Some feedback even hinted at the unsettling idea that AI might one day become indistinguishable from human counterparts. At the core of these reflections lies the profound question: Can a human pastor truly be substituted by AI?

3.2 Discussion with Respondents

A panel discussion on the AI worship service with Jonas Simmerlein, Melitta Müller-Hansen, the Broadcasting Commissioner of the

⁹ Alexa, starte den Gottesdienst!, 57:51.

Evangelical Lutheran Church in Bavaria, the theologian and techno-anthropologist Anna Puzio, and the author of this article followed.

Simmerlein explained his methodology in curating the worship service. He systematically fed the ChatGPT AI with thematic prompts, following which the AI produced the requisite texts. These were subsequently expressed by the avatars. Simmerlein noted that a staggering 98 % of the content originated from the AI, rendering his personal input minimal. Although he had previously orchestrated a comparable worship service in Vienna, to his understanding, this endeavor marked the inaugural AI-rendered worship service in Germany. He perceived this venture as an experimental effort to gather insights.

Conversely, Melitta Müller-Hansen offered a critical perspective on the use of artificial intelligence in worship services. According to her, the quintessential art of oration is compromised when AI supplants human speakers. Müller-Hansen expressed concerns about the absence of dramaturgy and theological profundity in the sermons delivered by AI. She worried that the incorporation of AI could lead to superficiality and a functionalization of the worship service. Furthermore, Müller-Hansen examined the idea of AI expressing divine sentiments and criticized the robotic behavior of AI avatars. She emphasized the importance of personal experiences and the essence of human interactions in worship services.

In contrast, Anna Puzio took a profoundly affirmative stance towards the AI worship service. She lauded the initiative as an innovative endeavor and emphasized the importance of deciphering the dynamics of human–AI relationships. Puzio recognized the potential benefits of AI in religious contexts and viewed the AI-powered worship service as a means to new insights and experiences.

Throughout the discussion with the audience, a recurrent critique pertained to the monotonous timbre of the AI-voiced avatars, conspicuously devoid of human nuances. Anchored in the ancient Hebrew Bible principle, “The throat is the soul”, traditionally attributed to humans, a central question arose: Is it feasible to align this principle with artificial intelligence? Does the AI’s vocalization bear any signs of an intrinsic persona?¹⁰

¹⁰ The discussion focused on the Hebrew word *nefesh*, originally meaning “throat” but translated as *psyché* (soul) in the Septuagint. Wenzel: Braucht religiöser

These considerations give rise to a series of profound inquiries, chief among them: “Within the confines of AI, which entity resonates as the ‘I’ and which represents the ‘we’?”

Transcending these reflections, one participant recognized the potential utility of AI in pastoral roles, especially in remote areas where human resources might be limited.

3.3 Media Coverage of the AI Worship Service

The AI-generated worship service garnered significant media attention even before it took place. A media overview of German-language articles and a press review from international media are available.¹¹ The articles underscored the innovative and technological prowess of integrating AI into religious practices. Simultaneously, they brought forth reservations and critiques. A predominant sentiment in the coverage was skepticism, particularly regarding the AI’s capability to mimic the emotional richness and empathy intrinsic to human-led sermons. Frequent points of discussion included the AI’s emotionless demeanor, monotonic delivery and potential for misrepresenting religious texts. Notwithstanding these criticisms, there were commendations concerning the AI’s linguistic proficiency and its consistent delivery of religious content. In sum, the media sentiment veered slightly towards a cautious or negative stance on incorporating AI into religious ceremonies.

Glaube, 19, applies this concept to the reality of religious experience. The discussion in Fürth only touched on the concept of *nefesh* in relation to the avatar, but further analysis would be helpful on how an avatar can be *perceived* as having or not having a soul. *Brand: Virtuelle Menschenreproduktion*, 116, points out that AI machines that are copies of human beings and simulate them can be viewed as a “reference” to a *real* human being.

¹¹ *Reimann: Deutschlands erster KI-Gottesdienst*; and: *Reimann: Germany’s First AI Worship* respectively.

4. Anthropomorphization: Is AI a Human?

Meredith Whittaker discussed the evolution of the term “Artificial Intelligence” in her keynote address at re:publica 2023.¹² It appeared as a marketing catchphrase in the early 2010s, with its renaissance being mainly championed by leading technological conglomerates. Although the term describes the use of data-centric, statistical models, it is essential to acknowledge its academic origins, which stem from fields such as cybernetics, automata theory, information processing and, more recently, machine learning.

The power of terminology in shaping discourse and comprehension cannot be overstated. One must speculate on the direction the conversation would have taken if cybernetics had maintained its prominence or if information processing had persisted in its unadorned form.

Using the term “intelligence” potentially anthropomorphizes the technology, imparting human-like attributes based mainly on the choice of words. This anthropomorphic tendency was apparent in the AI Worship Service at Kirchentag, as evidenced by the promotional text: “Alexa, initiate the service! An AI worship service conducted and originated by machine.” Liturgy: GPT 3, Artificial Intelligence, in San Francisco/USA”. Interestingly, the event’s program designates ChatGPT with a pastoral role, similar to the listing of human clergy in other Kirchentag events. The headquarters of OpenAI is referred to as the chatbot’s home residence, underscoring an uncritical, almost human-like attribution to the AI entity.

The primary objective and purpose of tools like ChatGPT (or similar AI utilities) is to generate text, visuals or musical compositions. Depending on how users address the AI in dialogs or their choice of pronouns (‘he’, ‘she’, ‘it’ or ‘they’) when talking about the AI, certain attributions are made regarding the nature of the AI bot. Anthropomorphizing chatbots can inadvertently elevate their perceived status, suggesting that they embody human traits like empathy.

Texts produced by the AI were represented via avatars, crafting an illusion that the AI was orchestrating the worship in a pastoral capacity. However, it is pivotal to note that these avatars are mere technical manifestations devoid of distinct personalities. On a per-

12 re:publica: Meredith Whittaker, 2:21.

sonal note, I grappled with moments when the avatar utilized the term “us”, alluding to both themselves and the congregation, including me.

In curating the service’s audiovisual components, Simmerlein intentionally chose to use avatars that resembled humans to facilitate interactions with ChatGPT. Simmerlein had other alternatives, such as utilizing a basic voice interface or a more mechanical presentation. Nevertheless, by picking human-like representations, Simmerlein ended up amplifying the human features that participants may attribute to the AI. This design choice enhanced the participants’ immersion and emphasised their anthropomorphic tendencies. Therefore, the specific setting and the visual presentation significantly contributed to the audience’s inclination to anthropomorphize the AI.

The AI operated in a pastoral capacity during the service. However, a pastor’s responsibilities extend past generating liturgy or officiating during a service. A pastor is fundamentally a human being, with connections and relationships to members of the congregation. No matter how advanced AI becomes, it will always lack this relational dimension that is intrinsic to human pastors because they live with their congregation.

The emotional void perceived in ChatGPT’s responses was a commonly expressed concern among the participants (“does not replace humans on an emotional level”, “impersonal”). Although AI’s ability to simulate emotions may improve through technological advances, the question persists: Can AI ever genuinely experience emotions? Current established scientific research suggests that AI, despite its advanced level of development, is not sentient.¹³ Though it may be capable of replicating emotions, it does not possess the innate ability to truly experience or comprehend them like humans do.

5. Opportunities and Limitations

5.1 Design

While most of the worship service was created by AI, important decisions were made by Simmerlein. It is essential to acknowledge that

¹³ *Cosmo*: Google.

this represents only one interpretation of a worship service driven by AI. For example, it was decided that the AI was displayed on a screen within the altar area as an avatar, but various other configurations are possible. Alternative methods of representation could consist of utilizing off-stage voice narrations, having individuals such as actors or actresses articulate the text, or even using a robot. Each of these choices would undoubtedly impact the reception and experience of the congregation during the service in different ways.

5.2 Linearity

The pre-recorded worship service was later presented to a congregation. Simmerlein had the ability to intervene and correct any AI-generated output that could have been considered inappropriate. This mechanism of control guaranteed that the content delivered was within acceptable limits.

If the AI worship service had been conducted in real time, there would have been ample opportunities for more dynamic interactions between the AI and the congregation. However, this could also pose potential risks of unintended behavior or output from the AI. An illustrative example of such unpredictability with ChatGPT is cited by Kevin Roose¹⁴. In light of these potential pitfalls, it was prudent for this experimental service to opt for a linear, pre-recorded format. This approach achieved a balance between demonstrating the potential of AI in a religious setting and ensuring that the content remained appropriate and in line with the intended spiritual goals.

5.3 Bias

ChatGPT is built on a large language model that has been shown to hold biases regarding gender¹⁵ and religion¹⁶. Implementing this AI in religious contexts can potentially perpetuate these biases.

14 *Roose: A Conversation.*

15 *Brown et al.: Language Models*, 36f.

16 *Ibid.*, 38.

Despite the significant amount of attention ChatGPT has received, it does not perform optimally in the fields of churches, Biblical studies, theology and religious matters. The problem with ChatGPT is not only its isolated inaccuracies, but also the challenge of its dependability. An alarming aspect of using ChatGPT, especially in theological contexts, is the necessity for expert knowledge to verify its output. Without such specialized insight, relying on ChatGPT in theological, Biblical, and religious areas can become problematic due to its proclivity for errors. A discernible inclination towards fundamentalist theological viewpoints has been identified.¹⁷

It is yet to be determined how ChatGPT will evolve, but ongoing feedback may influence its capabilities.¹⁸ However, it is advisable to exercise caution when using it in nuanced areas such as theology and worship for the time being.

6. AI Experiment Reveals What Matters in Worship Services

The AI worship project functions as a reflective instrument, similar to a mirror, which allows for a deeper understanding of traditional worship services led by humans.

Analyzing AI-led worship provides clarity on essential elements that compose a meaningful worship service. The AI worship service, conducted at the Kirchentag acts as such a mirror, if we compare it to traditional in-person or digital services.

A notable insight emerged regarding the indispensable significance of a pastor's distinct demeanor and essence. It became apparent that the avatar, lacking a singular personality, was frequently deemed unremarkable. Correspondingly, although ChatGPT may produce homogenized sermons reflective of the internet's corpus, congregants crave personal, meaningful messages during worship services. Generic directives, such as "The text suggests that we should...", often fall short in evoking the desired spiritual connection.

17 *Reimann: Theology*.

18 GPT-3 was used for this worship service, as noted in Kirchentag-Programmdatenbank. According to *Hines: History*, GPT-4 became available in April 2023. *Roose: AI* states that it is currently impossible to systematically evaluate an AI system's capabilities and demonstrate improvements over previous versions.

Furthermore, diverse avatars representing different genders and a person of color were deliberately chosen for the AI service. Incorporating this diversity could significantly enhance traditional worship services. Additionally, including a broader range of individuals, not limited to clergy, in readings and prayers can promote inclusivity.

Genuine interactions between worship leaders and the congregation are essential in any worship service. However, the AI version lacked depth and only provided minimal interactions. In addition, the AI service lacked the spatial dynamism commonly found in traditional services. The avatars remained static on the screen, whereas traditional services benefit from a variety of liturgical positions, such as the altar, pulpit or lectern. The lack of positional shifts was noticeable to the congregation and contributed to the overall monotony.

In summary, these insights address specific aspects of the AI worship service and highlight a broader theme: the incorporation of AI in religious contexts prompts us to reassess and establish the fundamental components of conventional worship services.

Bibliography

Alexa, Starte Den Gottesdienst! Ein KI-Gottesdienst von und aus der Maschine, 2023. Online at: https://player.vimeo.com/video/824065546?dnt=1&badge=0&autopause=0&player_id=0&app_id=58479.

Brand, Lukas: Virtuelle Menschenreproduktion, in: *Pirker, V./Pišonić, K. (eds.): Virtuelle Realität und Transzendenz. Theologische und pädagogische Erkundungen*, Freiburg i.Br. 2022, 97–116.

Brown, Tom B./Mann, Benjamin/Ryder, Nick et al.: Language Models Are Few-Shot Learners, 2020, <https://doi.org/10.48550/ARXIV.2005.14165>.

Buie, Elizabeth: Exploring Techno-Spirituality. Design Strategies for Transcendent User Experience, 2018. Online at: <https://nrl.northumbria.ac.uk/id/eprint/33799/1/Elizabeth%20Anne%20Buie%20Final%20Thesis.pdf>.

Cosmo, Leonardo De: Google Engineer Claims AI Chatbot Is Sentient. Why That Matters, in: *Scientific American*, 2022. Online at: <https://www.scientificamerican.com/article/google-engineer-claims-ai-chatbot-is-sentient-why-that-matters/>.

Hines, Kristi: History Of ChatGPT. A Timeline Of The Meteoric Rise Of Generative AI Chatbots., in: *Search Engine Journal*, 2023. Online at: <https://www.searchenginejournal.com/history-of-chatgpt-timeline/488370/>.

Kirchentag-Programmdatenbank: Zentrum Digitale Kirche und Gottesdienst. Podium: Alexa, starte den Gottesdienst! Ein KI-Gottesdienst von und aus der Maschine, 2023. Online at: <https://www.kirchentag.de/programm/pgd/programmsuche>.

pipio.ai: Create And Add Digital Actors And Voice Over To Your Videos, 2023. Online at: <https://pipio.ai>.

Pischl, Nahome/Sanoll, Nadine/Gomez, Alicia Martin et al.: 'Alexa, starte den Gottesdienst!' Deutschlands erster KI-Gottesdienst, in: Kirchentag.de, 2023. Online at: <https://www.kirchentag.de/meldungen/donnerstag/ki-gottesdienst>.

Reimann, Ralf Peter: Deutschlands erster KI-Gottesdienst auf dem Kirchentag: Ein faszinierendes Experiment mit zukunftsweisenden Fragen, in: TheoNet 0, 2023. Online at: <https://theonet.de/2023/06/12/deutschlands-erster-ki-gottesdienst-auf-dem-kirchentag-ein-faszinierendes-experiment-mit-zukunftsweisenden-fragen/>.

Reimann, Ralf Peter: Germany's First AI Worship Service: A Fascinating Experiment with Far Reaching Questions, in: TheoNet 0, 2023. Online at: <https://theonet.de/2023/06/30/germanys-first-ai-worship-service-a-fascinating-experiment-with-far-reaching-questions/>.

Reimann, Ralf Peter: Theology and AI. ChatGPT Misplaces The Reformer John Calvin In The 20th Century, in: TheoNet 0, 2023. Online at: <https://theonet.de/2023/02/08/theology-and-ai-chatgpt-misplaces-the-reformer-john-calvin-in-the-20th-century/>.

re:publica 2023: Meredith Whittaker – AI, Privacy, And The Surveillance Business Model [DE], 2023. Online at: https://www.youtube.com/watch?v=x_vD1KUfh18.

Roose, Kevin: A Conversation With Bing's Chatbot Left Me Deeply Unsettled, in: The New York Times, 2023. Online at: <https://www.nytimes.com/2023/02/16/technology/bing-chatbot-microsoft-chatgpt.html>.

Roose, Kevin: A.I. Has A Measurement Problem, in: The New York Times, 2024. Online at: <https://www.nytimes.com/2024/04/15/technology/ai-models-measurement.html>.

Simmerlein, Jonas: Sacred Meets Synthetic: A Multi-Method Study on the First AI Church Service, in: Review of Religious Research, 67 (1), 2025, 126–145. DOI: 10.1177/0034673X241282962.

Wenzel, Knut: Braucht religiöser Glaube Realität?, in: *Virtuelle Realität und Transzendenz: Theologische und Pädagogische Erkundungen*, in: Pirker, V./Pišonić, K. (eds.): *Virtuelle Realität und Transzendenz. Theologische und pädagogische Erkundungen*, Freiburg i.Br. 2022, 18–28.