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Aesthetics and Cartography: Post-Critical Reflections on Deviance in and of Representations

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Abstract: Cartographic representations are subject to sensory perception and rely on the translation of sensory perceptions into cartographic symbols. In this respect, cartography is closely related to aesthetics, as it represents an academic discipline of sensory perceptions. The scholarly concern with cartographic aesthetics, by today, has strongly been focused on the aesthetic impact of cartographic representations. The consideration of the philosophical sub-discipline of aesthetics however is rather restrained. This is also true for the connection between sociological questions and the social construction of aesthetic judgments. We address both topics in this article. We refer to post-critical cartographic theory. It accepts the socially constructed nature and power-bound nature of maps but does not reject "traditional" and widely established positivist cartography. Drawing on the theory of deviant cartographies related to this, we understand cartography designed according to aesthetic criteria as meta-deviant, as it makes the contingency of world interpretations clear. Especially augmented and virtual environments show a great potential to generate aesthetically constructed cartographic representations. Participatory cartography enables many people to reflect on the contingency of their spatial experiences and spatial abstractions without expert-like special knowledge. A prerequisite, however, is the greatest possible openness to topics and representations. This is not subject to a moral restriction.

Keywords: aesthetics; cartography; deviant cartography; post-critical cartography; neopragmatism; modernism; postmodernism

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1. Introduction

Cartography can be understood as the translation of sensory perception into representations based on (changeable) professional conventions. In the past, these representations were mainly two-dimensional approaches, before three-dimensional forms of representations became more and more established [1–4]. Today, approaches of virtual and augmented realities broaden the spectrum of 3D cartography [5–9].

If we follow the approach of cartography, as it results from the first part of the presented conceptual understanding, aesthetics would be a central access mode of cartography. Until the 18th century, the old European notion of the unity of the true, the beautiful, and the good dominated (e.g., in [10,11]).Aesthetics, as an independent philosophical discipline, emerged only in the modern era [12,13]. The work 'Aesthetica' by Alexander Gottlieb Baumgarten [14] introduced a new way of thinking about the aesthetic that "increasingly displaced the paradigm of an ontologically based theory of the beautiful that had survived from antiquity and the Middle Ages" [15]. Baumgarten's reflections on aesthetics can be understood as a fundamental turn in the approach to aesthetics, since he upgraded sensuality to the medium of cognition [16].

This obvious mode of attention is overlaid by the second aspect of our conceptual understanding of cartography: the professional conventions. These (changeable) professional conventions have led to a hegemony of positivistic thinking, which aims at a simple

mapping of facts (especially evident in topographic cartography). This is criticized by representatives of critical cartography. However, this approach of map-making, both in the form of the underlying conventions and the (extensive) state monopolization of (topographic) cartography, is strongly associated with the binding of power. These are discussed to be revealed, criticized and overcome (among many: [17–20]). The "traditional cartography" was even declared "dead" in this context [21]. In contrast to a cartography (powerfully) executed by trained cartographers, a 'counter-mapping' driven by inequalities and that affected people themselves was suggested and discussed (e.g., [22–26]).

In recent years, Alexander Kent has elaborated on the importance of aesthetics for cartography, addressing critical aspects, especially concerning the power of representations. This is also increasingly taken into account in web cartography [27–30]. Web cartography in particular not only opens up increasing possibilities for the design of cartographic representations. It also enables an increasing number of people (without a special education in cartography and related sciences) to create and distribute cartographic representations [31,32]. Our work follows a similar path. We acknowledge the power-bound nature of maps as aesthetic objects. However, we extend this consideration in the direction of philosophical and sociological research on aesthetics.

The existing literature on cartographic aesthetics is strongly focused on the aesthetic impact of cartographic representations. However, the connection to the philosophical sub-discipline of aesthetics is rather unexplored. The same is true for the connection to sociological questions of the social construction of aesthetic judgments. We would like to address this research gap in this paper. In our approach, we especially draw on the tradition of aesthetics published in German-speaking countries, as this has led to the formation of aesthetics as an independent sub-discipline of philosophy. In the international negotiation of cartographic aesthetics, it has hardly found resonance so far, and we intend to broaden the spectrum of philosophical and sociological theory in cartographic aesthetic research with this article. For this purpose, we make use of elaborate considerations on another aesthetic synthesis of spatially arranged material objects, i.e., the research field of landscape aesthetics. This field is also based on the exploration of social patterns of interpretation, categorization, and evaluation, and it leads to a spatial synthesis (among others: [33–38]).

In our contribution, we follow up on the development of a post-critical cartography [39,40], considering the rejection of dysfunctional aspects of critical cartography, such as its criticism of a power-bound nature of maps. Our aim with this essay is to clarify the contingency of cartographic interpretations of the world, in the form of functional and meta-functional deviances, by means of a return to the aesthetic dimension of cartographic representations. In our article, we deal with deviations from the current cartographic tradition in two ways: Firstly, with deviancies that produce innovative forms of cartographic representations, and secondly, with deviancies that provide opportunities for developing and testing contingent thinking (here in relation to cartographic representations).

This article will first deal with a brief introduction to the approach of deviant cartographies, which emerged from the theoretical operationalization of post-critical cartographies. Followed by this, we will deal with central (and for cartography relevant) aspects of philosophical aesthetics as well as the importance of aesthetic judgments for social processes of distinction. We will then apply these considerations to the development of cartographic representations and illustrate them using case examples the cartographic representation of post-industrial objects (in virtual reality representations). In the conclusion, we will again highlight the importance of aesthetics for cartography and elaborate perspectives from the chosen theoretical framework.

2. Basic Theoretical Considerations: Deviant Cartographies

The development of the deviant cartographies approach [40,41] resulted from the critical reflection of critical cartography pursued since the 1980s. Critical cartography claimed to represent a new paradigm against the positivist tradition of cartography. This was classified as outdated [39]. Instead of the complete replacement of one paradigm by

another, the authors rather prefer a neo-pragmatic approach (the philosophical foundations: [42,43]; to transfer to the concern with spaces: [44–46]). The basis for an evaluation of the development of theories, research questions, methods, etc. is not going back to moral preferences or ideological principles, but to the questions of whether they are suitable for the progress of the discipline or social understandings of space. As a measure of suitability, we built on the concept of life chances.

This concept is originally based on Max Weber [47] and it is further differentiated by Ralf Dahrendorf [48,49]. Dahrendorf understands life chances, figuratively speaking, as "the baking forms of human life in society; they determine how far people can develop" [48] (p. 24). Dahrendorf [48] (p. 98), who followed Max Weber [47] considers that a chance is a "structurally based [...] probability of behavior" as well as "something that the individual can have, something as an opportunity to satisfy interests" [48] (p. 98). These chances are "socially shaped. Social structures order opportunities" [48] (p. 98). Life chances originate in options (as choices of action) and ligatures (as a socially predetermined structure of norms, roles, and social positions). Moreover, ligatures give meaning to options. However, they also restrict options, since they morally influence the development of options. An example is the attainment of higher education through religious restrictions [50] (see in more details: [51–53]).

The basis for this study of functionality implies deviance, an established term and concept in sociology. Deviance describes the deviation of behavior from an existing (often unquestioned) norm [54]. This deviation from a norm can have functional and dysfunctional effects. Deviation from a norm, for example, can highlight confidence in the ability of a society (or parts of it) to regulate itself. However, it can also serve to clarify norms or lead to innovation [55]. Especially the scientific process of knowledge is constitutively bound to deviation from existing conventions. However, these deviances have to prove their suitability [56].

In order to conceptualize this, four types of functional deviance have been distinguished ([40]; see also: [57–60]):

Deviance that proves to be suitable in relation to the professional, further: scientific or social development, as they expand life chances, can be described as functional.

Deviance that limits life chances are described as dysfunctional. It proves to be unsuitable for the scientific and social progress.

Deviance can be described as a-functional, if there is no reception of any resonance from a scientific to a social point of view.

Such deviance can be considered meta-functional if it is suitable to reflect the social construction processes of the world and makes people aware of the contingency of world interpretations.

Against the backdrop of this terminology, critical cartography has achieved a meta-functional impact because it has initiated a reflection on the cartographic construction of the world, including its power-bound nature. However, an important point of criticism, i.e., the securing of power through the governmental monopolization of geospatial data, has become irrelevant. Geospatial data is now made freely available by official (national and/or regional) agencies in many countries [61]. In the meantime, it has also become possible to use digital maps and virtual and augmented reality applications by means of commercial offers. Therefore, it is hardly possible to speak of a isolation of expert knowledge based on commercial interests [62–64]. The persistence of this argument seems dysfunctional in view of the achievements of a (positivistically pursued) cartography established by public authorities. It is not least the foundation for spatial orientation on the Earth's surface (and beyond). This is widely ignored by critical cartography. The expansion of access to low-threshold software tools has greatly increased the possibilities for creative production of cartographic representations. As a result, the call by critical cartographers for artistic creation and participatory involvement has proven largely a-functional. While this has greatly expanded, it is widely based on commercially developed tools rather than on activist counter-mapping [40].

An artistic but also a participatory cartography updates the question of the design of cartographic representations. For a long time, it seemed to be pushed into the background as a result of standardization efforts [30,65]. The increased importance of design, in turn, raises the question of aesthetic reflection and classification. As a basis for such a reflection and classification, the recourse to philosophical and sociological aesthetics becomes important. On the one hand, this enables the connection of cartographic-aesthetic considerations to a centuries-old tradition of the science of sensual perception. On the other hand, cartographic-aesthetic communication can be grasped in its social meanings. This is what we will deal with in the following section.

3. Aesthetics between Philosophical Foundations and Social Distinctions

In his work 'Aesthetica',Alexander Gottlieb Baumgarten [14] introduces a new form of thinking about the aesthetic which "replaces the paradigm of an ontic paradigm of an ontologically based theory of the beautiful that has come down to us from antiquity and the Middle Ages." [15] (p. 7). The doctrine of sensual perception (Aisthetike Episteme) thus becomes complementary to the doctrines of thinking (Logike Episteme) and morality (Ethike Episteme; [12,66]). In the following, we will briefly introduce essential basic terms of philosophical and sociological aesthetics. Later, we apply them to questions of cartography.

The central concept of aesthetic reflections is formed by the concept of beauty. Thus, the development of aesthetics can be understood as a history of "a constant reinterpretation of the concept of beauty" [67] (p. 100). Beauty can be characterized as "unity in multiplicity" [68] (p. 63). However, the ability to perceive beauty is linked to conditions. Following Kant [69], beauty is something that is generally pleasing without interest. An interest, for example, can refer to the economic use of something. For the perception of beauty, it is fundamental that no immediate (e.g., economic) individual or social interest would exist in the object described as "beautiful". This view of the separation between aesthetic and practical world is contradicted by John Dewey [70,71]. Thus, "beauty" can be seen as being guided by interests. It could certainly have a consumptive meaning, which is indicated not least by the consumptive meaning of material spaces described as landscapes influenced by tourism [72].

A complement to the concept of beauty is that of sublimity. A fundamental distinction between the two concepts can be described by Edward Burke [73]: the beautiful inspires love, the sublime generates admiration. Thus, the experience of the sublime is bound to large, impressive or terrible material objects. Material objects from the realm of the 'natural' become dominant here. Berleant (1997: 28) refers to this, such as volcanoes, dark forests, or high mountains. Kant moves away from Burke's strong object-centeredness by founding the beautiful "in the harmonious interplay of understanding and sensual imagination ('Einbildungskraft')" ([74] (p. 38); see also [75,76]). In contrast, he traces "the 'sublime' to a disharmonious interplay of reason and sensuous imagination." [74] (p. 38). Compared to the beautiful, the access to understanding the sublime is more difficult. It belongs "to the feeling of the sublime the powerlessness and questioning of the subject in the face of the overpowering nature, of the invading 'too much'." [77] (p. 10). The sublime resists the effort of intellectual control ([77] following Kant). With this non-ambiguity and the deprivation of intelligible control, the sublime resists the efforts of modernity in its striving for unambiguity and cognitive domestication [36,77,78]. In a nutshell, the project of modernity can be understood as an attempt to anesthetize the world, i.e., to withdraw it from aesthetic perception, whereby it "does not evoke an aesthetic experience" ([79] (p. 28); in more detail in [80]). With the emergence of the postmodern discussion since the 1970s, the sublime has experienced a renaissance ([81]; cf. also [82]), while the beautiful entered a crisis in the second half of the 20th century: after all, the "aesthetics of the beautiful [...] had uncritically degenerated into mere 'design' and had been reduced to a commodity in the consumer society" [83] (p. 90). The "threatening oversaturation, anesthetization, and social desensitization" [84] (p. 229) became the subject of conservative as well as (Neo-)Marxist social criticism.

The picturesque arises from a tension that is particularly widespread in landscape painting. It arises from the combination of objects and object constellations in the foreground that are connoted with "beauty" (often: flowers) with objects and object constellations in the background that are considered "sublime" (mountains or storm clouds; for example: [85,86]). This motif arrangement is still common in landscape photography today.

The ugly, in turn, like the beautiful, compared to the sublime, evokes "no too strong emotions. One pleases, the other does not; one produces pleasure, the other aversion, which as a sensation is arguably stronger than its positive counterpart, may also give rise to immediate reactions, but is rarely felt as dramatic" [87] (p. 72). In his 'Aesthetics of the Ugly' Karl Rosenkranz conceptualizes [88] the ugly as the "negative beautiful," assigning to the ugly a "secondary existence" [88] (pp. 14–15). He assigns three manifestations to the ugly:

1. Amorphia, the shapelessness or an indeterminacy of the shape. Beauty is not achieved in the absence of a 'being-appropriate' limitation or of the unity in the necessary difference (cf: [89]).
2. Asymmetry, the imbalance of opposites. He also describes this form of ugliness as unshaped.
3. Disharmony, the disproportion between the part to the whole. In place of the agreement, a disunity arises here. This is produced by the generation of "wrong" contrasts.

The ugly, according to Rosenkranz [88], is not trapped in itself, but can, like the beautiful, experience an aesthetic revaluation through a transformation towards 'das Komische' (in English approximately: the comic, the funny, the strange, the weird). It unites 'das Komische', "the beautiful and the ugly by liberating both from their respective (pseudo-ideal) one-sidednesses." [90] (p. 61). The highest form of transformation of the ugly (as well as of the beautiful or picturesque) into 'das Komische' is the caricature accompanied by means of exaggeration and disproportion.

A central question of aesthetics is formed by whether, for instance, the beautiful (but also the ugly, comic, etc.) is a property of an object or the attribution by the observer. The former, naturalistic position of an 'objective aesthetics' is already represented by Plato [91]. He attributes an underlying idea to every object. The degree of beauty is measured by the degree to which the object succeeds in (materially) expressing the idea that characterizes it. This essentialist conception is contrasted with the subjectivist conception of aesthetics. This was made prominent by Francis Hutcheson (1694–1747; [92]): beauty arises on the basis of the ability to feel beauty. Because of this ability, people are able to have an aesthetic perception by combining uniformity and multiplicity of material objects. In this understanding, beauty is always linked to the process of perception. Theodor Vischer (1807–1887; [93] (p. 438)) succinctly states: "beauty is not a thing, but an act." The subjectivist understanding of the beautiful (the ugly, the picturesque, etc.) has far-reaching consequences. If beauty becomes a "product of the subject and his mental dispositions and faculties" [94] (p. 3), the question of the nature and condition of these "dispositions and faculties" becomes the focus of the study of aesthetics. Thus, the aesthetic also becomes an object of sociological research. Kant had already pointed out the social conditionality of aesthetic judgments. On the one hand, aesthetic patterns of interpretation and evaluation have to be learned (a question of socialization). On the other hand, there is the question of how aesthetic judgments are media of stratification in society. For example, this is pointed out by Pierre Bourdieu [95] in his study on distinction mechanisms in society. In particular, "legitimate taste" distinguishes itself from "middle taste" through the production of new aestheticized objects or the aesthetic charging of familiar objects. The latter does not have these aesthetic access patterns but tries to imitate them. This causes the "legitimate taste" to develop new aesthetic attributions. The pejorative aesthetic judgment of the superior taste towards the subordinate tastes is kitsch. The associated judgment of the "bad taste" implies the (distinctive) attribution of a lack of self-realization. This lack of self-realization is measured by an aesthetic standard that is declared to be valid universally [96]. This difference between trivial and high culture, in turn, is subject to leveling in the context of postmodern individualization and further differentiation [97,98]. The patterns of

distinction, which were formerly applied to society as a whole, are now found at best in milieu-specific discourse communities [99].

Aesthetic access to the world by humans is multisensory and not limited to the (nevertheless dominant) sense of vision. While the sense of vision, as a sense of distance, suggests an abstracted access to the external world. The perception of the media of the world is directly connected to other senses through material interaction with the body (see already: [100]). Through this bodily involvement, a synesthetic turning to the world takes place. Synesthetics is understood as the synthesis of different sensual perceptions in an aesthetic mode. The preoccupation with synesthetics is strongly oriented toward atmospheres. These can be described, following Thibaud [101], as a medium of sensual relations between the sensing human being and his environment. This experience of the world in the form of atmospheres in turn leads from a cognitive preoccupation with aesthetic stimuli to a preoccupation with emotional attentions to the world.

Regardless of the aesthetic concept, it becomes clear: the imprinted patterns of aesthetic access to the world, according to Seel [102], are tied to experience. Aesthetic experience has become a "self-reflexive lifeworld experience, that is, an 'experience of experience'" [103] (p. 31). An exception is the atmospheric turning to the world. Here, experiencing is practiced and not a reflecting.

4. The Operationalization of Aesthetic References in Cartography

The cartographic representation of "something" represents the result of a threefold construction process [104]:

a. On the basis of socially mediated and individually updated patterns of interpretation, categorization, and valuation, (mostly material) objects are subjected to a synthesis (for example, as a landscape).
b. These syntheses, in turn, are translated into a cartographic symbol (usually professionally mediated) based on relevance criteria into a cartographic representation.
c. The interpreter of these cartographic representations constructs them on the basis of her or his internalized patterns of interpretation, categorization, and valuation. These are often based on common sense understandings of the mapped world (a) and of cartographic representations (b).

These relationships become more complex when, as a result of increasing participation processes, the producer and recipient sides are no longer clearly separated. This results in a network structure of production and reception. This connection also becomes more complex when it is taken into consideration that all steps of world observation, production and interpretation of cartographic representations are subject to sensory cognition. Thus, aesthetic judgments are always included as well. This shows the importance of addressing the relationship between aesthetics and cartography. We address this following basic concept of philosophical and sociological aesthetics introduced in the previous section:

A functional deviance produced by critical cartography is the assertion of the social (and individual) constructedness of maps. The finding of the social constructedness of cartographic representations can be understood as a functional deviance in the history of cartography. This functionality arises not least from the fact that it enables a connection to research in social and cultural sciences. Social constructivist thinking, as it has become prevalent in social science landscape research (among many: [105–108]), is also connected to the interpretation of the process of map production presented above. From this perspective, also in relation to cartographic representations, the subject (in recourse to the learned and updated aesthetic patterns of interpretation, categorization and evaluation) is the constitutive instance of aesthetic judgments. This also determines aesthetic inscriptions in cartographic representations. In principle, this concerns the attribution of aesthetic judgments, for instance in relation to the beautiful, the sublime, the picturesque, the ugly, kitsch, and 'das Komische', but in a thoroughly differentiated manner.

Beyond the presented basic considerations on the topic of aesthetic construction of cartographic representations, the aspect of beauty has some peculiarities: It is rarely

found on the side of the represented; after all, the largest number of objects described as "beautiful" is below the threshold of what can be mapped for reasons of scale (such as individual species of vegetation). The objects attributed as "beautiful" are accordingly subject to generalization in a special way, which can take place in two ways. The first way refers to the process of generalization. Aesthetic judgments about "beautiful" individual material objects are generalized (e.g., the material arrangement of various individual grass, trees and other vegetation species into "green spaces"). The second way is to transpose the beautiful with the sublime into the picturesque. Thus, aspects of material space that can be experienced as sublime are translated cartographic representations, such as mountains. Topographic objects that are commonly evaluated as beautiful fall below the threshold of representation because they are commonly considered too small. On the side of representation, the "beautiful" can be inscribed in cartographic representations, for example, through the use of "harmonious" color choices and proportioning of symbols and ornaments. The evaluation of these style aspects, however, is dependent on the zeitgeist, as we will discuss later. The challenge of cartographic translation of the sublime, however, is somewhat different: 'traditional' positivist cartography has played a significant role in 'disenchanting' the sublime(in the sense of: [109]). It transfers material objects formerly experienced as sublime into the realm of a calculable, manageable, and abstracted cognitive construction of the world; the sublime has been domesticated by means of cartographic representation [110]. On the side of cartographic representations, the sublime is indicated, for example, by the shading in the representation of mountains, such as in the Official Cartography of Switzerland. While the scale reduction (just from the dimension) makes it difficult to experience maps in the mode of sublimity in classical cartography, VR-based cartography (incl. immersion) can certainly help to create such an experience. The synthesis of beauty and sublimity in picturesqueness unites the statements about the two modes of aesthetic construction. In this respect, we now turn to ugliness. In ugliness, there is a translation to the anesthetic means of abstract symbology. On the side of cartographic representation, ugliness is definitely present, as it cannot be avoided even through abstraction, generalization and formalization. This is especially obvious when the depicted objects themselves or their distribution (after translation into the language of cartography) evoke a representation characterized by amorphousness, asymmetry, and disharmony. Cartographers have a greater influence on the avoidance of "ugliness" in the design of cartographic representations when it comes to the design and arrangement of the legend (unless these are standardized).

Generalizing these remarks, we can speak of an attempt by modernity to withdraw the world in general and cartographic representations in particular from aesthetic reference. Thus, the attempt is made to transfer the references into the realm of the anesthetic. This transfer succeeded with artifacts, such as maps (or in a larger dimension: functionalist urban planning), rather than this was possible with more naturally formed objects and object constellations. On the one hand, this is due to the inherent logic of natural objects (a mountain range can only be removed with great effort), on the other hand, it is also due to aesthetic persistence that is not least rooted in Romanticism [111]. However, even with artifacts, success remained incomplete. Even in topographic cartography, attempts to completely displace aesthetic representations were ultimately unsuccessful, as Alexander Kent [65] impressively illustrates with the arrangement and design of cartographic symbols.

The theme of multisensory technology in and of cartographic representations can also be interpreted with the theme of fundamental scientific and social changes: In spatial research before the 20th century, non-visual stimuli were quite present [112]. Raab understands the extensive fading out of the non-visual senses in modern science [113] (p. 16) as immanent to the quality criteria of this science (such as freedom of value, general validity and comprehensibility): for example, "visual perception could be assigned both optical qualities (colors) of a physically measurable dimension (wavelength of light)". Furthermore, a manageable subjective category system for the classification of these qualities is available (e.g., basic colors). In contrast, "in the olfactory domain, neither consistent

relationships between the chemical–physical characteristics of scents and their sensations are discernible, nor are systematic classification criteria, according to which subjective scent qualities can be ordered, available" [113] (p. 16). Olfactory and acoustic stimuli are also challenging for mapping for another reason: they are usually fleeting. Accordingly, the preoccupation with them has been pushed back in favor of the preoccupation with visual stimuli. Here, after all, there is a simpler translation from an optical stimulus by means of conveying subject-specific conventions to a medium that is related to the sense of vision. The restriction is broken in the course of new technical possibilities (e.g., VR and AR cartography). Using these opportunities, the hematic fixation is not reduced to only exactly measurable and locatable physical objects (for example: [114–116]; more on this in detail in the following sections).

The triad of pre-modernity, modernity and post-modernity is also connected to the cartographic meaning of kitsch. The modernization of cartography took place not least in the form of standardizations and the pushing out of individual (socially shaped) aesthetic preferences in the design of maps. Thus, the map was transformed in large parts from an object designed according to aesthetic ideas to an anesthetic object. This was accompanied by the distinctive devaluation of the map and its authors. The map was no longer a medium of a creative practice (from which pride and recognition could be generated), but the processing of technical routines. A map was designed following the modernist urge for order, categorization, and the generation of monovalences (one object, one function). The principle of "form follows function" offered no room for ornamentation on the one hand, nor for outdated aesthetic standards that could have been described as "kitsch" by subsequent generations of cartographers and users. With the de-standardization and individualization that characterize post-modernization, new possibilities for the return of aesthetic cartographic representations opened up, in conjunction with the development and spread of technical innovations. Irony is considered an essential stylistic element of postmodern communication [43] to highlight the contingency of world constructions. This can also be used in cartographic representations, with the aim of visually emphasizing the contingency of spatial constructs [45,46]. In the sense of aesthetics, 'das Komische' can be used as an example: By means of exaggeration and disproportion, irony can be symbolized here, and contingency can be made clear. Concrete symbols (with their particular openness to exaggeration), but also unusual combinations of symbols, are particularly suitable for such a metafunctional-deviant cartography. However, an ironic distance to the usual norms of cartographic representations can also be created by an unusual selection of orientation indications in the design of topographic bases of thematic maps. The postmodern re-entry of the aesthetic into cartography means that cartographic representations (again) become polyvalent. They receive an explicit aesthetic charge in addition to the function of the thematic statement. Even if general distinctive aesthetic standards are hardly socially widespread anymore, distinctive aesthetic standards continue to be milieu-specific. Accordingly, cartographic representations designed with artistic approaches not only become outdated in terms of content, but their form also runs the risk of being subjected to a distinctive aesthetic judgment by a subsequent generation of mapmakers: Kitsch!

5. Possibilities of Reintegrating Aesthetic References by Means of Virtual and Augmented Realities

The current possibilities of cartographic integration of virtual and augmented realities (VR/AR) means a considerable expansion of representation possibilities. These can be used not least for a design of cartographic representations that focus on creativity and the testing of new aesthetic approaches. These possibilities of new cartographic representations are not limited to the visual symbol language, but also allow, for example, the integration of soundscape elements (Figure 1). When using appropriate hardware, tactile and occasional olfactory elements can also be integrated.

Figure 1. A multisensory urban traffic situation for immersive VR experience. (Source: Marco Weißmann & Dennis Edler).

This enables a multisensory experience of cartographic representations instead of a solely visual cognitive attention. The multisensory approach in turn can contribute to strengthening the aesthetic attention to spaces and their representations. One possibility for this is already known from computer game cartography. The gradual transition from an abstract cartographic 2D representation to an elevated and detailed 3D landscape representation, accompanied by the transition of a musical background, up to concrete sound elements. These are usually connoted with landscape experiences and can also be supported with the action of avatars (e.g., navigation) by means of cartographic representations [117–123]. However, immersive 3D representations have other functions in the (aesthetic) construction of spaces. By applying a reduction of complexity, repeatability is made possible. This is based on the fact that there is a limited selection of possible elements in a spatial arrangement, but also a reduced number of options for action. They can also be related to the extent of virtual spaces, as this is usually limited as well. This contributes to the experience of aesthetic contingency. Thus, it can have a meta-functional effect [124,125].

The development of virtual cartographic representations not only imply hybridizations and the creation of smooth transitions (for example, as shown above, of an abstract 2D map and elevation representations), they also enable the consideration of social hybridizations. It refers to augmented forms of representation that enable the integration of different (cartographic) elements into the representation of material spaces. The degree of integration can range from sparse to intensive, from an addition of virtual elements to the integration of complex, even multisensory information [126–130]. Social hybridizations have an effect on the differentiation of commonsense and 'expert special knowledge stocks' regarding to spatial questions. They also influence the cartographic representation of spatial information. This is based on the availability of low-threshold (mostly commercial) offers for the generation of cartographic representations [40,131]. This is also where the possibilities of creative representations arise, beyond classical standardized procedures which characterized cartography as a discipline for a long time.

The possibilities that virtual and augmented cartographic representations offer in terms of aesthetics have not yet been fully explored and investigated. They range from the adaptation of representations according to current user interests, to the user-oriented individual design of cartographic representations according to the user's ability to understand complex representations. In addition, they contain sensory capabilities to process cartographic representations (e.g., in case of color vision deficiencies), and they have great

potentials for user-oriented real-time visualization, e.g., by using modern techniques and methodologies of artificial intelligence [132,133].

With post-industrialization (e.g., [134]), there is a change from "industrial-space" to "post-industrial-space" ([135] (p. 193)). The transformation of places of work into residual spaces is accompanied by two symbolic patterns of attribution. On the one hand, they represent symbols of failure. On the other hand, they are objects of aestheticization [136,137]. Aestheticization is essential in our context, and it takes place through the transfer of patterns of interpretation and aestheticization originating from the times of industrialization (Figure 2).

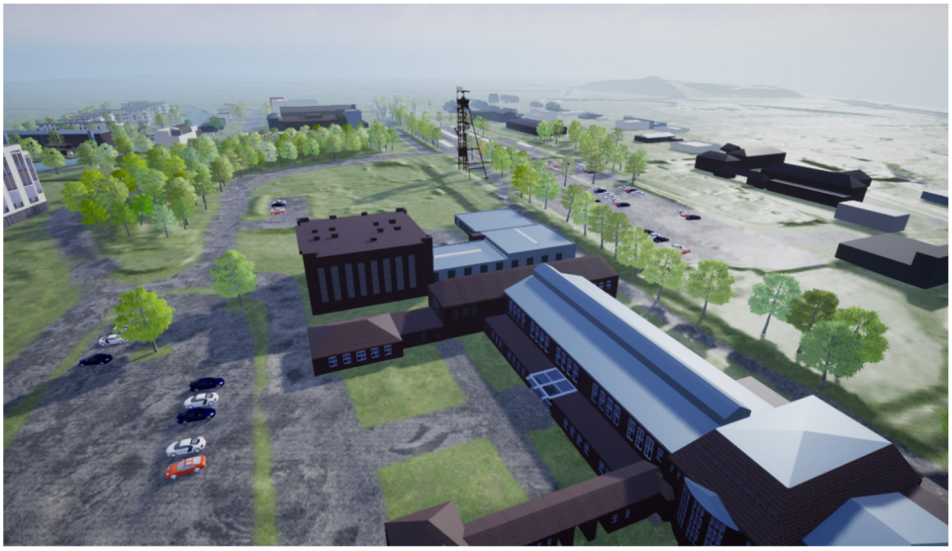

Figure 2. An oblique bird's eye view on a post-industrial area in the Ruhr Valley represented in immersive VR. Buildings of the industrial past are preserved and integrated into the landscape architectural setting of the present. (Source: Timo Wiedenlübbert & Dennis Edler).

Old industrial (urban)landscapes combine "baroque aesthetics of ruin with decaying blast furnaces and memories of the picturesque garden of the eighteenth century" ([138] (p. 154)). In analogy to pre-modern agricultural life, old industrial objects become symbols of the "simple, hard worker's life" [139] (p. 231). However, they can be interpreted as a reaction to the de-standardization and fragmentation of post-industrial society (cf. [140–142]). This aestheticization, in turn, is initiated by the bearers of "legitimate taste" by (almost arbitrarily) turning objects from the realm of the worthless into media of social distinction, for instance by staging them using out-of-context illumination (as, for example, in the photographs of Bernd and Hilla Becher; [143]). Based on modern VR and AR techniques and methodologies, these old industrial landscapes can be represented in a multisensory way. As these VR applications support immersion, the process and results of aestheticization is supported based modern media of 3D cartographic communication (e.g., VR environments).

6. Conclusions

The critique by critical cartography concerning 'traditional' cartography relates in some parts explicitly and in others implicitly to aspects of the aesthetic construction of the world through cartographic representations. It is explicit in the call for artistic cartography. It is less explicit (with exceptions) in the secondary consequence of anesthetization. This anesthetization of cartography occurred with the enforcement of the positivist paradigm and the principle of 'form follows function', which was essentially related to the standardization of cartographic symbols in abstract rather than concrete symbol language. However, this anesthetization also occurs to a certain canonization of what can be represented. While the enforcement and maintenance of the positivist paradigm is understood as a powerful process, the distinctive function that aesthetic interpretations and evaluations contribute to

this process is only hardly considered. With the canonization of representations, not only a canonization of the representable takes place, but also a contingency reduction of the modes of representation. The artistic design of cartographic representations is however associated with an activist mission. This is made clear by the rejection of design. This makes maps a commodity. Here, the link to a (somewhat naive) search for the authentic, not professionalized, also becomes obvious. The critical rigorism of Critical Cartography towards "traditional" cartography can accordingly be characterized as dysfunctional, as its abandonment goes along with the reduction of life chances. At the same time, the power-bound nature of "traditional" cartography is reflected (similarly: [144]). It is only acceptable if more life chances are created by positivist cartography than life chances are lost by power-boundness. However, the same is true for critical cartography. It also strives for a hegemonic power of interpretation: who is when and in which context is allowed to create cartographic representations of certain socially defined issues and who just is not. In this respect, we suggest neopragmatic considerations of evaluating cartographic representations according to the criteria of usefulness, suitability, and usefulness for cognition. We continue to recognize great functional-deviant potentials for positivist cartography, while the functionality of critical cartography has some dysfunctional implications, as we will explain in the following.

Moreover, the demands for artistic and participatory scenarios of cartography, as suggested by critical cartography, remain a-functional to a large extend. Maps are classified as morally acceptable if they are designed out of a critical mindset. Corresponding developments outside the critical discourse are—accordingly rejected, especially if they can be outlined as commercial products [24]. Activist mapping has largely remained a marginal social phenomenon. In particular, it has the function of achieving gains in distinction when different people prefer different forms of creating and designing cartographic representations. These individuals, who exhibit a different worldview on cartography, represent "a pathological case" [145] (p. 47) (see in detail: [50]). Central concerns of critical cartography, such as an artistic design and a greater participation of people without professional backgrounds, have become more important in recent years and decades. Activist counter-mapping, however, has remained a marginal phenomenon in these fields. This contradicts the claim of critical cartography in particular, of critical science in general, to be avant-garde of social change (here as an expression of cartography). Participatory cartography thus shows potentials of realizing contingency and of expanding individual life chances as a result of reflecting on one's own spatial constraints on the one hand and one's own spatial constructions on the other hand. However, it also bears the danger of dysfunctional deviance, through the overemphasis of (moral) ligatures and thus the limitation of options. Based on the norm of expanding life chances, artistic approaches in cartography can generally be attributed a great meta-functional potential. They can support becoming aware of spatial contingency. Moreover, they provide an occasion to reflect on contingency in the transformation of physical space into cartographic representations, their reduction of complexity and intricacy. Any reduction of complexity and intricacy, however, runs the risk of freezing into ligatures. For example, if the rules on which the reduction is based are no longer subject to critical reflection but are solidified into unquestioned instructions.

The re-aestheticization of cartography, however, is not solely carried by people without appropriate professional training, including artists. Even in professional cartography, new forms of translating the beautiful, the sublime, the picturesque, the ugly, etc. into the language of cartography are emerging. Going beyond this, an increasing openness to innovative symbol languages as well as the use of new technologies facilitates a design that is aligned with aesthetic ideas. We have also indicated this in this article. Cartography conducted in this way is not only aware of the contingency of its 'world-making', but also highlights it through the use of (self-)irony. This stands out from the persistence that characterizes cartographic representations generated based on the 'jargon of moral ligatures'. This (self-)irony (in the sense of [43]) is distinguished by its self-distance from a critical cartographic determination of the will to deconstruct the other [146–148].

In our article, we have shown how the concepts of philosophical and sociological aesthetics can be profitably introduced for a reflexive engagement with cartography. We have thus outlined an approach that can be used to investigate the development of maps, virtual and augmented representations, complementary to content and technical issues.

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References

1. Buchroithner, M. *True-3D in Cartography: Autostereoscopic and Solid Visualisation of Geodata*; Springer: Berlin/Heidelberg, Germany, 2012, ISBN 9783642122729.
2. Fernández, A.; Iván, P.; Buchroithner, M.F. *Paradigms in Cartography: An Epistemological Review of the 20th and 21st Centuries*; Springer: Berlin/Heidelberg, Germany, 2014.
3. Vetter, M. 3D-Visualisierung von Landschaft–Ein Ausblick auf zukünftige Entwicklungen. In *Handbuch Landschaft*; Kühne, O., Weber, F., Berr, K., Jenal, C., Eds.; Springer VS: Wiesbaden, Germany, 2019; pp. 559–573.
4. Bröhmer, K.; Knust, C.; Dickmann, F.; Buchroithner, M.F. Z-axis Based Visualization of Map Elements–Cartographic Experiences with 3D Monitors Using Lenticular Foil Technology. *Cartogr. J.* **2013**, *50*, 211–217. [CrossRef]
5. Liu, B.; Ding, L.; Wang, S.; Meng, L. Designing Mixed Reality-Based Indoor Navigation for User Studies. *KN–J. Cartogr. Geogr. Inf.* **2022**, *72*, 129–138. [CrossRef]
6. Lochhead, I.; Hedley, N. Designing Virtual Spaces for Immersive Visual Analytics. *KN–J. Cartogr. Geogr. Inf.* **2021**, *71*, 223–240. [CrossRef]
7. Çöltekin, A.; Lochhead, I.; Madden, M.; Christophe, S.; Devaux, A.; Pettit, C.; Lock, O.; Shukla, S.; Herman, L.; Stachoň, Z.; et al. Extended Reality in Spatial Sciences: A Review of Research Challenges and Future Directions. *Int. J. Geo-Inf.* **2020**, *9*, 439. [CrossRef]
8. Hruby, F.; Ressl, R.; de La Borbolla Valle, G. Geovisualization with immersive virtual environments in theory and practice. *Int. J. Digit. Earth* **2019**, *12*, 123–136. [CrossRef]
9. Hruby, F.; Castellanos, I.; Ressl, R. Cartographic Scale in Immersive Virtual Environments. *KN–J. Cartogr. Geogr. Inf.* **2020**, *71*, 45–51. [CrossRef]
10. Augustinus, A. *Theologische Frühschriften. Vom Freien Willen (De Libero Arbitrio) u. Von der Wahren Religion (De Vera Religione)*; Artemis-Verlag: Zürich, Switzerland; Stuttgart, Germany, 1962; p. 390.
11. Areopagita, P.-D. *Über die Göttlichen Namen*; BGL: Stuttgart, Germany, 1988; p. 500.
12. Gilbert, K.E.; Kuhn, H. *A History of Esthetics*; Indiana University Press: Bloomington, IN, USA, 1953.
13. Majetschak, S. *Ästhetik zur Einführung*; Junius Verlag: Hamburg, Germany, 2007.
14. Baumgarten, A.G. *Ästhetik*; Meiner: Hamburg, Germany, 2009; pp. 1750–1758. ISBN 9783787318995.
15. Schneider, N. *Geschichte der Ästhetik von der Aufklärung bis zur Postmoderne: Eine Paradigmatische Einführung, 4. Auflage*; Reclam: Stuttgart, Germany, 2005, ISBN 3150094577.
16. Franke, U. Alexander Gottlieb Baumgarten. In *Ästhetik und Kunstphilosophie: Von der Antike bis zur Gegenwart in Einzeldarstellungen*; Nida-Rümelin, J., Betzler, M., Eds.; Krömer: Stuttgart, Germany, 1998; pp. 72–79.
17. Harley, B.J. Deconstructing the map. In *The New Nature of Maps. Essays in the History of Cartography*; Laxton, P., Ed.; John Hopkins University Press: Baltimore, MD, USA, 2002; pp. 149–168.
18. Wood, D.; Fels, J. Design on Signs/Myth and Meaning in Maps. *Cartogr. Int. J. Geogr. Inf. Geovis.* **1986**, *23*, 54–103. [CrossRef]
19. Crampton, J.; Krygier, J. An Introduction to Critical Cartography. *ACME Int. J. Crit. Geogr.* **2005**, *4*, 11–33.
20. Wood, D.; Krygier, J. Cartography: Critical Cartography. In *The International Encyclopedia of Human Geography*; Kitchin, R., Thrift, N., Eds.; Elsevier: Oxford, UK, 2009; pp. 345–357.
21. Wood, D. Cartography is Dead (Thank God!). *CP* **2003**, *45*, 4–7. [CrossRef]
22. Kim, A.M. Critical cartography 2.0: From "participatory mapping" to authored visualizations of power and people. *Landsc. Urban Plan.* **2015**, *142*, 215–225. [CrossRef]
23. Fellner, A.M. Counter-Mapping Corporeal Borderlands: Border Imaginaries in the Americas. In *Geographien der Grenzen: Räume–Ordnungen–Verflechtungen*; Weber, F., Wille, C., Caesar, B., Hollstegge, J., Eds.; Springer VS: Wiesbaden, Germany, 2020.
24. Schranz, C. Shifts in Mapping: Two Concepts have Changed the World View. In *Shifts in Mapping: Maps as a Tool of Knowledge*; Schranz, C., Ed.; Transcript Verlag: Bielefeld, Germany, 2021; pp. 23–37.

25. Counter Cartographies Collective; Craig Dalton; Liz Mason-Deese. Counter (Mapping) Actions: Mapping as Militant Research. *ACME* **2012**, *11*, 439–466.
26. Thatcher, J.; Bergmann, L.; Ricker, B.; Rose-Redwood, R.; O'Sullivan, D.; Barnes, T.J.; Barnesmoore, L.R.; Imaoka, L.B.; Burns, R.; Cinnamon, J.; et al. Revisiting critical GIS. *Environ. Plan. A Econ. Space* **2016**, *48*, 815–824. [CrossRef]
27. Kent, A.J. Aesthetics: A Lost Cause in Cartographic Theory? *Cartogr. J.* **2005**, *42*, 182–188. [CrossRef]
28. Kent, A.J. Maps, Materiality and Tactile Aesthetics. *Cartogr. J.* **2019**, *56*, 1–3. [CrossRef]
29. Kent, A. Cartographic Style and the Aesthetic Fix. *Cartogr. J.* **2017**, *54*, 1–4. [CrossRef]
30. Kent, A. From a dry statement of facts to a thing of beauty:understanding aesthetics in the mappingand counter-mapping of place. *Cartogr. Perspect.* **2013**, *73*, 39–60.
31. Griffin, A.L.; Fabrikant, S.I. More Maps, More Users, More Devices Means More Cartographic Challenges. *Cartogr. J.* **2012**, *49*, 298–301. [CrossRef]
32. Fabrikant, S.I.; Christophe, S.; Papastefanou, G.; Maggi, S. Emotional Response to Map Design Aesthetics. In Proceedings of the GIScience 2012: Seventh International Conference on Geographic Information Science, Columbus, OH, USA, 18–21 September 2012.
33. Bourassa, S.C. *The Aesthetics of Landscape*; Belhaven Press: London, UK, 1991, ISBN 978-1852930714.
34. Winchester, H.P.M.; Kong, L.; Dunn, K. *Landscapes: Ways of Imagining the World*; Routledge: London, UK; New York, NY, USA, 2003, ISBN 0-582-28878-9.
35. Wylie, J. *Landscape*; Routledge: Abingdon, UK, 2007, ISBN 9780203480168.
36. Kühne, O. *Landscape Theories: A Brief Introduction*; Springer VS: Wiesbaden, Germany, 2019.
37. Brook, I. Aesthetic appreciation of landscape. In *The Routledge Companion to Landscape Studies, 2. Auflage*; Howard, P., Thompson, I., Waterton, E., Atha, M., Eds.; Routledge: London, UK; New York, NY, USA, 2019; pp. 39–50, ISBN 9781315195063.
38. Porteous, J.D. *Environmental Aesthetics: Ideas, Politics and Planning*; Routledge: Abingdon, UK; New York, NY, USA, 2013, ISBN 9780203437322.
39. Kühne, O. Contours of a 'Post-Critical' Cartography–A Contribution to the Dissemination of Sociological Cartographic Research. *KN–J. Cartogr. Geogr. Inf.* **2021**, *71*, 133–141. [CrossRef]
40. Edler, D.; Kühne, O. Deviant Cartographies: A Contribution to Post-critical Cartography. *KN–J. Cartogr. Geogr. Inf.* **2022**, *72*, 103–116. [CrossRef]
41. Kühne, O.; Koegst, L. Cartographic Representations of Coastal Land Loss in Louisiana: An Investigation Based on Deviant Cartographies. *KN-J. Cartogr. Geogr. Inf.* **2022**, *2022*, 1–12. [CrossRef]
42. Rorty, R. *Consequences of Pragmatism: Essays: 1972–1980*; University of Minnesota Press: Minneapolis, MN, USA, 1982, ISBN 0816610649.
43. Rorty, R. *Contingency, Irony, and Solidarity, Reprint*; Cambridge University Press: Cambridge, UK, 1997, ISBN 9780521353816.
44. Kühne, O.; Koegst, L. *Land Loss in Louisiana: A Neopragmatic Redescription*; Springer VS: Wiesbaden, Germany, 2022.
45. Kühne, O.; Jenal, C. Baton Rouge–A Neopragmatic Regional Geographic Approach. *Urban Sci.* **2021**, *5*, 17. [CrossRef]
46. Kühne, O.; Jenal, C. Baton Rouge (Louisiana): On the Importance of Thematic Cartography for 'Neopragmatic Horizontal Geography'. *KN–J. Cartogr. Geogr. Inf.* **2020**, *71*, 23–31. [CrossRef]
47. Weber, M. *Wirtschaft und Gesellschaft: Grundriss der verstehenden Soziologie, 5., Revidierte Auflage*; Mohr, J.C.B., Ed.; Paul Siebeck: Tübingen, Germany, 1972; ISBN 3165336318.
48. Dahrendorf, R. *Lebenschancen: Anläufe zur Sozialen und Politischen Theorie*; Suhrkamp: Frankfurt, Germany, 1979; ISBN 3518370596.
49. Dahrendorf, R. *Der Moderne Soziale Konflikt: Essay zur Politik der Freiheit*; Dtv: München, Germany, 1994; ISBN 3-423-04628-7.
50. Kühne, O.; Berr, K.; Jenal, C. *Die Geschlossene Gesellschaft und Ihre Ligaturen: Eine Kritik am Beispiel 'Landschaft'*; Springer VS: Wiesbaden, Germany, 2022.
51. Kühne, O. Religion und Landschaft–Überlegungen zu einem komplexen Verhältnis aus sozialwissenschaftlicher Perspektive. In *Religion und Landschaft*; Bund Heimat und Umwelt in Deutschland, Ed.; Selbstverlag: Bonn, Germany, 2013; pp. 7–15, ISBN 9783925374319.
52. Kühne, O.; Leonardi, L. *Ralf Dahrendorf: Between Social Theory and Political Practice*; Palgrave Macmillan: London, UK, 2020.
53. Kühne, O. Landscape Conflicts: A Theoretical Approach Based on the Three Worlds Theory of Karl Popper and the Conflict Theory of Ralf Dahrendorf, Illustrated by the Example of the Energy System Transformation in Germany. *Sustain. Sci. Pract. Policy* **2020**, *12*, 6772. [CrossRef]
54. Berger, P.L.; Luckmann, T. *The Social Construction of Reality: A Treatise in the Sociology of Knowledge*; Anchor Books: New York, NY, USA, 1966, ISBN 0-385-05898-5.
55. Durkheim, É. *Die Regeln der Soziologischen Methode*; Luchterhand: Neuwied, Germany, 1961.
56. Popper, K.R. *The Logic of Scientific Discovery*; Harper & Row: New York, NY, USA, 1959.
57. Goode, E. *Deviant Behavior, 12. Auflage*; Routledge: New York, NY, USA; London, UK, 2019; ISBN 978-0-367-19317-1.
58. Becker, H.S. *Outsiders: Studies in the Sociology of Deviance*; The Free Press: New York, NY, USA, 1963.
59. Peuckert, R. Abweichendes Verhalten und soziale Kontrolle. In *Einführung in Hauptbegriffe der Soziologie, 6. Auflage*; Korte, H., Schaefers, B., Eds.; VS Verlag für Sozialwissenschaften: Wiesbaden, Germany, 2006; pp. 105–125, ISBN 978-3-531-90032-2.
60. Stehr, J. Normalität und Abweichung. In *Soziologische Basics: Soziologische Basics: Eine Einführung für Pädagogen und Pädagoginnen*; Scherr, A., Ed.; VS Verlag für Sozialwissenschaften: Wiesbaden, Germany, 2013; pp. 191–197.

61. Coetzee, S.; Ivánová, I.; Mitasova, H.; Brovelli, M. Open Geospatial Software and Data: A Review of the Current State and A Perspective into the Future. *ISPRS Int. J. Geo-Inf.* **2020**, *9*, 90. [CrossRef]
62. Keil, J.; Edler, D.; Schmitt, T.; Dickmann, F. Creating Immersive Virtual Environments Based on Open Geospatial Data and Game Engines. *KN–Ournal Cartogr. Geogr. Inf.* **2021**, *71*, 53–65. [CrossRef]
63. Lindner, C.; Ortwein, A.; Staar, K.; Rienow, A. Different Levels of Complexity for Integrating Textures Extra-terrestrial Elevation Data in Game Engines for Educational Augmented and Virtual Reality Applications. *KN-J. Cartogr. Geogr. Inf.* **2021**, *71*, 253–267. [CrossRef]
64. Könen, D.; Gryl, I.; Pokraka, J.; Zwischen, W. Interessenvertretung und Verantwortung: Bürger*innenbeteiligung am Beispiel Windkraft im Spiegel von Neocartography und Spatial Citizenship. In *Bausteine der Energiewende*; Kühne, O., Weber, F., Eds.; Springer VS: Wiesbaden, Germany, 2018; pp. 207–230. ISBN 978-3-658-19508-3.
65. Kühne, O. Urban nature between modern and postmodern aesthetics: Reflections based on the social constructivist approach. *Quaest. Geograph.* **2012**, *31*, 61–70. [CrossRef]
66. Reicher, M.E. *Einführung in die Philosophische Ästhetik, 3., Überarbeitete Auflage*; WBG: Darmstadt, Germany, 2015; ISBN 9783534739776.
67. Borgeest, C. *Das Sogenannte Schoene: Ästhetische Sozialschranken*; S. Fischer: Frankfurt, Germany, 1977; ISBN 3-10-007602-8.
68. Schweppenhäuser, G. *Ästhetik: Philosophische Grundlagen und Schlüsselbegriffe*; Campus-Verlag: Frankfurt, Germany, 2007; ISBN 3593383470.
69. Kant, I. *Kritik der Urteilskraft*; Unveränd. Neudr. der Ausg. von 1924; Meiner: Hamburg, Germany, 1959; ISBN 39a.
70. Dewey, J. *Experience and Nature*; Dover Publications: New York, NY, USA, 1958.
71. Dewey, J. *Kunst als Erfahrung*; Suhrkamp: Frankfurt, Germany, 1988, ISBN 3-518-28303-0.
72. Aschenbrand, E. *Die Landschaft des Tourismus: Wie Landschaft von Reiseveranstaltern Inszeniert und von Touristen Konsumiert Wird*; Springer VS: Wiesbaden, Germany, 2017.
73. Burke, E. *Philosophische Untersuchung über den Ursprung Unserer Ideen vom Erhabenen und Schönen, 2. Aufl.*; Meiner: Hamburg, Germany, 1989; ISBN 3787309446.
74. Peres, C. Philosophische Ästhetik: Eine Standortbestimmung. In *Kunst, Ästhetik, Philosophie: Im Spannungsfeld der Disziplinen*; Friesen, H., Wolf, M., Eds.; Mentis: Münster, Germany, 2013; pp. 13–69, ISBN 9783897857384.
75. Graham, G. *Philosophy of the Arts: An Introduction to Aesthetics*, 3rd ed.; Routledge: London, UK; New York, NY, USA, 2005; ISBN 9780415349796.
76. Lothian, A. Landscape and the philosophy of aesthetics: Is landscape quality inherent in the landscape or in the eye of the beholder? *Landsc. Urban Plan.* **1999**, *44*, 177–198. [CrossRef]
77. Pries, C. Einleitung. In *Das Erhabene: Zwischen Grenzerfahrung und Größenwahn*; Pries, C., Ed.; VCH Acta Humaniora: Weinheim, Germany, 1989; pp. 1–30, ISBN 3527176640.
78. Fayet, R. *Reinigungen: Vom Abfall der Moderne zum Kompost der Nachmoderne*; Passagen-Verlag: Wien, Austria, 2003; ISBN 9783851656046.
79. Linke, S. Ästhetik, Werte und Landschaft–eine Betrachtung zwischen philosophischen Grundlagen und aktueller Praxis der Landschaftsforschung. In *Landschaftsästhetik und Landschaftswandel*; Kühne, O., Megerle, H., Weber, F., Eds.; Springer VS: Wiesbaden, Germany, 2017; pp. 23–40.
80. Welsch, W. Das Ästhetische–eine Schlüsselkategorie unserer Zeit? In *Die Aktualität des Ästhetischen*; Welsch, W., Ed.; Fink: München, Germany, 1993; pp. 13–47. ISBN 9783770528967.
81. Lyotard, J.-F. Das Erhabene und die Avantgarde. In *Verabschiedung von der (Post-)Moderne?* Le Rider, J., Raulet, G., Eds.; Narr: Tübingen, Germany, 1987; pp. 251–269.
82. Welsch, W. *Unsere Postmoderne Moderne*; VCH Acta Humaniora: Weinheim, Germany, 1987; ISBN 3527175849.
83. Friesen, H. Philosophische Ästhetik und die Entwicklung der Kunst. In *Kunst, Ästhetik, Philosophie: Im Spannungsfeld der Disziplinen*; Friesen, H., Wolf, M., Eds.; Mentis: Münster, Germany, 2013; pp. 71–160, ISBN 9783897857384.
84. Recki, B. Stil im Handeln Oder Die Aufgaben der Urteilskraft. In *Kunst, Ästhetik, Philosophie: Im Spannungsfeld der Disziplinen*; Friesen, H., Wolf, M., Eds.; Mentis: Münster, Germany, 2013; pp. 221–244, ISBN 9783897857384.
85. Büttner, N. *Geschichte der Landschaftsmalerei*; Hirmer: München, Germany, 2006.
86. Carlson, A. *Nature and Landscape: An Introduction to Environmental Aesthetics*; Columbia University Press: New York, NY, USA, 2009; ISBN 9780231518550.
87. Liessmann, K.P. *Schönheit*; Facultas Verlags-und Buchhandels AG: Wien, Austria, 2009; ISBN 9783825230487.
88. Rosenkranz, K. *Ästhetik des Häßlichen, 2., überarbeitete Auflage*; Reclam: Leipzig, Germany, 1996; ISBN 3379015555.
89. Pöltner, G. *Philosophische Ästhetik*; Kohlhammer: Stuttgart, Germany, 2008; ISBN 9783170169760.
90. Hauskeller, M. *Was ist Kunst?: Positionen der Ästhetik von Platon bis Danto, 8*; Auflage; Beck: München, Germany, 2005; ISBN 3406459994.
91. Platon. *Werke in 8 Bänden*; WBG: Darmstadt, Germany, 2005.
92. Hutcheson, F. *Eine Untersuchung über den Ursprung Unserer Ideen von Schönheit und Tugend: Über Moralisch Gutes und Schlechtes*; Meiner: Hamburg, Germany, 1986; ISBN 3-7873-0632-3.
93. Vischer, F.T.V. *Kritische Gänge, 2., Verm. Auflage*; Meyer & Jessen: München, Germany, 1922.
94. Hartmann, E.V. *Philosophie des Schönen, 2. Aufl*; Wegweiser-Verlag: Berlin, Germany, 1924.

95. Bourdieu, P. *Distinction: A Social Critique of the Judgement of Taste*; Harvard University Press: Cambridge, MA, USA, 1984; ISBN 0674212800.
96. Illing, F. *Kitsch, Kommerz und Kult: Soziologie des Schlechten Geschmacks*; UVK Verlagsgesellschaft: Konstanz, Germany, 2006; ISBN 389669541X.
97. Liessmann, K.P. *Kitsch! Oder Warum der Schlechte Geschmack der Eigentlich Gute Ist*; Brandstätter: Wien, Austria, 2002; ISBN 9783854981701.
98. Welsch, W. *Ästhetisches Denken*; Reclam: Stuttgart, Germany, 2006.
99. Kühne, O. *Landscape and Power in Geographical Space as a Social-Aesthetic Construct*; Springer International Publishing: Dordrecht, The Netherlands, 2018; ISBN 3319729020.
100. Simmel, G. Soziologie der Sinne. *Die Neue Rundsch.* **1907**, *18*, 1025–1036.
101. Thibaud, J.-P. Die sinnliche Umwelt von Städten.: Zum Verständnis urbaner Atmosphären. In *Die Kunst der Wahrnehmung: Beiträge zu Einer Philosophie der Sinnlichen Erkenntnis*; Hauskeller, M., Ed.; SFG-Servicecenter Fachverlage: Kusterdingen, Germany, 2003; pp. 280–297.
102. Seel, M. *Die Kunst der Entzweiung: Zum Begriff der Ästhetischen Rationalität*; Suhrkamp: Frankfurt, Germany, 1985; ISBN 3518577301.
103. Lehmann, H. *Ästhetische Erfahrung: Eine Diskursanalyse*; Wilhelm Fink: Paderborn, Germany, 2016; ISBN 3846761397.
104. Kühne, O. Potentials of the Three Spaces Theory for Understandings of Cartography, Virtual Realities, and Augmented Spaces. *KN-J. Cartogr. Geogr. Inf.* **2021**, *71*, 297–305. [CrossRef]
105. Koegst, L. Potentials of Digitally Guided Excursions at Universities Illustrated Using the Example of an Urban Geography Excursion in Stuttgart. *KN-J. Cartogr. Geogr. Inf.* **2022**, *72*, 59–71. [CrossRef] [PubMed]
106. Kühne, O. *Landschaftstheorie und Landschaftspraxis: Eine Einführung aus Sozialkonstruktivistischer Perspektive*; 3., Aktualisierte und Überarbeitete Auflage; Springer VS: Wiesbaden, Germany, 2021.
107. Aschenbrand, E. Einsamkeit im Paradies. Touristische Distinktionspraktiken bei der Aneignung von Landschaft. *Berichte. Geogr. Und Landeskd.* **2016**, *90*, 219–234.
108. Greider, T.; Garkovich, L. Landscapes: The Social Construction of Nature and the Environment. *Rural. Sociol.* **1994**, *59*, 1–24. [CrossRef]
109. Weber, M. *Wissenschaft als Beruf, 11. Auflage*; Duncker & Humblot: Berlin, Germany, 2011; ISBN 9783428135097.
110. Stichweh, R. Raum und moderne Gesellschaft: Aspekte der sozialen Kontrolle des Raumes. In *Die Gesellschaft und ihr Raum: Raum als Gegenstand der Soziologie*; Krämer-Badoni, T., Ed.; Leske+Budrich: Opladen, Germany, 2003; pp. 93–102, ISBN 3810040223.
111. Kirchhoff, T.; Trepl, L. Landschaft, Wildnis, Ökosystem: Zur kulturbedingten Vieldeutigkeit ästhetischer, moralischer und theoretischer Naturauffassungen: Einleitender Überblick. In *Vieldeutige Natur: Landschaft, Wildnis und Ökosystem als Kulturgeschichtliche Phänomene*; Kirchhoff, T., Trepl, L., Eds.; Transcript: Bielefeld, Germany, 2009; pp. 13–68, ISBN 3899429443.
112. Faure, P. *Magie der Düfte: Eine Kulturgeschichte der Wohlgerüche von den Pharaonen zu den Römern*; Artemis & Winkler: München, Germany, 1993; ISBN 3760819230.
113. Raab, J. Die Soziale Konstruktion Olfaktorischer Wahrnehmung: Eine Soziologie des Geruchs. Available online: http://kops.uni-konstanz.de/bitstream/handle/123456789/11429/260_1.pdf?sequence=1&isAllowed=y (accessed on 20 December 2018).
114. Kühne, O.; Edler, D. Multisensorische Landschaften–die Bedeutung des Nicht-Visuellen bei der sozialen und individuellen Konstruktion von Landschaft und Herausforderungen für ihre Erfassung und Wiedergabe. *Berichte. Geogr. Und Landeskd.* **2018**, *92*, 27–45.
115. Meenar, M.; Kitson, J. Using Multi-Sensory and Multi-Dimensional Immersive Virtual Reality in Participatory Planning. *Urban Sci.* **2020**, *4*, 34. [CrossRef]
116. Edler, D.; Kühne, O. Nicht-visuelle Landschaften. In *Handbuch Landschaft*; Kühne, O., Weber, F., Berr, K., Jenal, C., Eds.; Springer VS: Wiesbaden, Germany, 2019; pp. 599–612.
117. Horbiński, T.; Zagata, K. Map Symbols in Video Games: The Example of "Valheim". *KN–J. Cartogr. Geogr. Inf.* **2021**, *71*, 269–283. [CrossRef]
118. Kühne, O.; Edler, D.; Jenal, C. The Abstraction of an Idealization: Cartographic Representations of Model Railroads: Die Abstraktion der Idealisierung–über kartographische Repräsentationen von Modellbahnlandschaften. *KN–J. Cartogr. Geogr. Inf.* **2021**, *71*, 207–217. [CrossRef]
119. Zagata, K.; Gulij, J.; Halik, Ł.; Medynska-Gulij, B. Mini-Map for Gamers Who Walk and Teleport in a Virtual Stronghold. *ISPRS–Int. J. Geo-Inf.* **2021**, *10*, 96. [CrossRef]
120. Kühne, O. Representations of landscape in the strategy game Civilization. In *The Social Construction of Landscape in Games*; Edler, D., Kühne, O., Jenal, C., Eds.; Springer: Wiesbaden, Germany, 2022; pp. 261–272.
121. Kaltman, E. The Construction of Civilization. *Kinephanos* **2014**, *1*, 105–118.
122. Fontaine, D. Landscape in Computer Games–The Examples of GTA V and Watch Dogs 2. In *Modern Approaches to the Visualization of Landscapes*; Edler, D., Jenal, C., Kühne, O., Eds.; Springer VS: Wiesbaden, Germany, 2020; pp. 293–306.
123. Pietsch, S.M. Landscape as Frontier–Experiencing the *Wild West in Red Dead Redemption 2* (2018). In *The Social Construction of Landscape in Games*; Edler, D., Kühne, O., Jenal, C., Eds.; Springer: Wiesbaden, Germany, 2022; pp. 273–288.
124. Kühne, O.; Edler, D.; Jenal, C. Landschaften und Spiele: Von Virtualisierungen, Hybridisierungen und der Steigerung von Kontingenz. *Berichte. Geogr. Und Landeskd.* **2022**, *96*, 246–267. [CrossRef]

125. Schuster, K. The Social Psychological Function of Play. In *The Social Construction of Landscape in Games*; Edler, D., Kühne, O., Jenal, C., Eds.; Springer: Wiesbaden, Germany, 2022; pp. 39–57.
126. Koegst, L. Über drei Welten, Räume und Landschaften: Digital geführte Exkursionen an Hochschulen aus der Perspektive der drei Welten Theorie im Allgemeinen und der Theorie der drei Landschaften im Speziellen. *Ber. Geogr. Und Landeskd.* **2022**, *69*, 288–308. [CrossRef]
127. Stintzing, M.; Pietsch, S.; Wardenga, U. How to Teach "Landscape" Through Games? In *Modern Approaches to the Visualization of Landscapes*; Edler, D., Jenal, C., Kühne, O., Eds.; Springer VS: Wiesbaden, Germany, 2020; pp. 333–349.
128. Pietsch, S.M.; Stintzing, M.; Heyer, I. SpielRäume–Entdeckungs- und Erlebnisraum Landschaft. *GW Unterr.* **2020**, *1*, 37–49. [CrossRef]
129. Dickmann, F.; Keil, J.; Dickmann, P.L.; Edler, D. The Impact of Augmented Reality Techniques on Cartographic Visualization. *KN-J. Cartogr. Geogr. Inf.* **2021**, *71*, 285–295. [CrossRef]
130. Edler, D.; Dickmann, F. Interaktive Multimediakartographie in frühen Videospielwelten–Das Beispiel „Super Mario World". *KN–J. Cartogr. Geogr. Inf.* **2016**, *66*, 51–58. [CrossRef]
131. Fish, C.S. Elements of Vivid Cartography. *Cartogr. J.* **2021**, *58*, 150–166. [CrossRef]
132. Edler, D.; Edler, S.; Dickmann, F. Eine empirische Studie zu Effekten von simulierter Gründblindheit (Deuteranopie) auf das kartenbasierte Positionsgedächtnis. *Kartogr. Nachr.* **2015**, *65*, 183–194.
133. Schnürer, R.; Sieber, R.; Schmid-Lanter, J.; Öztireli, A.C.; Hurni, L. Detection of Pictorial Map Objects with Convolutional Neural Networks. *Cartogr. J.* **2021**, *58*, 50–68. [CrossRef]
134. Bell, D. *The Coming of Post-Industrial Society: A Venture in Social Forecasting*; Basic Books: New York, NY, USA, 1999.
135. Lash, S.; Urry, J. *Economies of Signs and Space*; SAGE Publications: London, UK, 1994; ISBN 0803984723.
136. Kühne, O. Soziale Akzeptanz und Perspektiven der Altindustrielandschaft: Ergebnisse einer empirischen Untersuchung im Saarland. *RaumPlanung* **2007**, *3*, 156–160.
137. Jenal, C. (Alt)Industrielandschaften. In *Handbuch Landschaft*; Kühne, O., Weber, F., Berr, K., Jenal, C., Eds.; Springer VS: Wiesbaden, Germany, 2019; pp. 831–841.
138. Hauser, S. Industrieareale als urbane Räume. In *Die Europäische Stadt*; Siebel, W., Ed.; Suhrkamp: Frankfurt, Germany, 2004; pp. 146–157.
139. Vicenzotti, V. Kulturlandschaft und Stadt-Wildnis. In *Kulturen der Landschaft: Ideen von Kulturlandschaft Zwischen Tradition und Modernisierung*; Kazal, I., Voigt, A., Weil, A., Zutz, A., Eds.; Technische Universität Berlin: Berlin, Germany, 2006; pp. 221–236.
140. Höfer, W. *Natur als Gestaltungsfrage: Zum Einfluß Aktueller Gesellschaftlicher Veränderungen auf die Idee von Natur und Landschaft als Gegenstand der Landschaftsarchitektur. Dissertation*; Herbert Utz Verlag GmbH: München, Germany, 2001.
141. Fischer, L. Das Erhabene und die ‚feinen Unterschiede': Zur Dialektik in den sozio-kulturellen Funktionen von ästhetischen Deutungen der Landschaft. In *Natur–Kultur: Volkskundliche Perspektiven auf Mensch und Umwelt*; Brednich, R.W., Schneider, A., Werner, U., Eds.; Waxmann: Münster, Germany, 2001; pp. 347–356, ISBN 978-3-8309-1100-5.
142. Eisel, U. *Landschaft und Gesellschaft: Räumliches Denken im Visier*; Westfälisches Dampfboot: Münster, Germany, 2009; ISBN 3896917722.
143. Sander, A.; Blossfeldt, K.; Renger-Platzsch, A.; Becher, B.; Becher, H. *Vergleichende Konzeptionen*; Schirmer/Mosel: München, Germany; Paris, France; London, UK, 1997.
144. Kent, A.J. Trust Me, I'm a Cartographer: Post-truth and the Problem of Acritical Cartography. *Cartogr. J.* **2017**, *54*, 193–195. [CrossRef]
145. Grau, A. *Hypermoral: Die neue Lust an der Empörung, 2. Auflage*; Claudius: München, Germany, 2017; ISBN 9783532628034.
146. Kühne, O.; Berr, K.; Jenal, C.; Schuster, K. *Liberty and Landscape: In Search of Life-Chances with Ralf Dahrendorf*; Palgrave Macmillan: Basingstoke, UK, 2021.
147. Sofsky, W. *Verteidigung des Privaten: Eine Streitschrift*; Beck: München, Germany, 2007; ISBN 3-406-56298-1.
148. Kersting, W. *Verteidigung des Liberalismus*; Murmann: Hamburg, Germany, 2009; ISBN 9783867740739.