Digital Nature Representation: Ecocritical Perspectives on the Children's App Kubbe Makes Shadow Theatre

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ABSTRACT

Combining two topics in modern children's literature, that of new forms of representation afforded by digital media and that of ecocriticism, this article applies an ecocritical perspective to the reading of a narrative app for children, namely Åshild Kanstad Johnsen and Ciber's Kubbe Makes Shadow Theatre (Kubbe lager skyggeteater, 2013), asking how this app presents and represents nature.

Drawing on ecocritical scholarship on children's literature (Goga et al., 2018) and placing its approach within this field, the article pays attention to the ways in which the digital medium shapes and affects the nature representation in the app. It argues that *Kubbe Makes Shadow Theatre* invites play as a cybertext (Aarseth, 1997) by enabling its users to add and subtract semiotic modes in the course of a reading and identifies a new performance mode, the Ambient mode. Allowing for the muting of the narrative voice, the Ambient performance mode foregrounds Kubbe's forest environment and is thus ecocritically significant. Based on the app's play with semiotic modes, the article goes on to analyse the ecocritical potential of the various modes in terms of their contribution to the app's nature representation, with an emphasis on the Ambient performance mode.

Key words:
digital apps, cybertext, ecocriticism, performance modes, nature representation

PRESENTING KUBBE

The narrative app *Kubbe Makes Shadow Theatre* is part of a transmedial story world developed by the Norwegian picturebook author and illustrator Åshild Kanstad Johnsen that currently comprises three picturebooks and two digital apps. The term 'transmedial' was coined by Henry Jenkins to denote fictional narratives that are distributed across media platforms and where each medium makes a unique contribution to the unfolding of the story (2011). The picturebooks about Kubbe are: *Kubbe Makes a Museum* (*Kubbe lager museum*, 2010), *Kubbe Makes Noise* (*Kubbe lager spetakkel*, 2011) and *Kubbe's Album of Everything* (*Kubbes album om alt*, 2013), which have reached an international audience in Scandinavia, Europe and Asia.[1] The Kubbe apps are: the game app *Kubbe Tidies Up* (*Kubbe rydder* 2013) and the narrative app with which this analysis is concerned, *Kubbe Makes Shadow Theatre* (see fig. 1). *Kubbe Makes Shadow Theatre* tells the story of how Kubbe, a cross between a human child and a wooden log, learns to make shadow theatre by drawing on the natural resources around him. Supported by the educational narrative of his grandmother, Kubbe learns how light and shadow can function as a storytelling medium and puts his knowledge to use in a theatre production of Little Red Riding Hood that is attended by his fellow forest dwellers.

A 'born-digital' or 'digital native' text (Schwebs, 2014, p. 2), *Kubbe Makes Shadow Theatre* is written and illustrated by Åshild Kanstad Johnsen. Kristian Pedersen is responsible for the animations and Henrik Skram for the music and sound effects, while the narrator's voice belongs to the actor Kim Haugen. The ecocritical analysis of the app's semiotic modes is focused on what Hadassah Stichnothe terms

Fig. 1
(screenshot): The paratexts of *Kubbe Makes Shadow Theatre* visually paraphrases the content of the story app while presenting the app's reader with a menu of reading choices on the right hand side. Reprinted with permission from Åshild Kanstad Johnsen.

the 'text' of the app, which 'comprises its totality of verbal, visual, sonic, and interactive elements' (2014, p. 2).

ECOCRITICISM AND CHILDREN'S LITERATURE

The point of departure for this ecocritical analysis of the app *Kubbe Makes Shadow Theatre* is the understanding that children's texts are mediated or constructed representations – and that they thus contain constructed or crafted representations of nature and the environment (Goga et al. 2018, p. 13). Drawing on a heritage of Romantic poetry and American nature writing, the first thorough and influential works to establish and apply an ecocritical perspective to literature were Lawrence Buell's *The Environmental Imagination: Thoreau, Nature Writing, and the Formation of American Culture* (1995) and Cheryl Glotfelty and Harold Fromm's *The Ecocriticism Reader: Landmarks in Literary Ecology* (Goga et al., 2018, p. 6-7). In this early text, Sheryl Glotfelty defines ecocriticism as 'the study of the relationship between literature and the physical environment' (Glotfelty, 1996, xix). Within children's literature, a starting point for the discussion of landscape is Jane Suzanne Carroll's *Landscapes in Children's Literature* (2011), in which Carroll provides a critical methodology for the study of landscape, discussing four types of space: sacred spaces, green spaces, roadways and lapsed spaces, with a particular focus on Susan Cooper's *The Dark Is Rising Sequence.*

Since Glotfelty's 1996 definition of ecocriticism, the field has expanded rapidly as a consequence of growing environmental concern among literary scholars to incorporate various facets of the debate on the posthuman (see Braidotti 2013, Hayles 1999, 2017, Haraway 1991, 2008, 2016, Wolfe 2010) and to include not only natural and rural landscapes, but also urban and artificial environments, in what has come to be known as the second wave of ecocriticism (Buell, 2005). Consequently, Greg Gerrard, another influential figure within ecocritical studies, notes that 'the widest definition of the subject of ecocriticism is the study of the rela-

tionship of the human and the non-human throughout human cultural history and entailing critical analysis of the term "human" itself' (2012, p. 5). Important reference points for the discussion of the posthuman within children's literature are Victoria Flanagan's *Technology and Identity in Young Adult Fiction* (2014) and Zoe Jaques' *Children's Literature and the Posthuman: Animal, Environment, Cyborg* (2015).

Scott Slovic has further identified a third ecocritical wave, characterised by an exploration of global concepts of place 'in fruitful tension with neo-bioregionalist attachments to specific locales' (2010, p. 7). Within the field of children's literature, *New World Orders in Contemporary Children's Literature: Utopian Transformations* (Bradford et al., 2007) straddles the second and third waves, while Alice Curry's *Environmental Crisis in Young Adult Fiction: A Poetics of Earth* (2013), which examines how global processes are mapped onto local landscapes through an ecofeminist lens, and *Ecocritical Perspectives on Children's Texts and Cultures: Nordic Dialogues* (Goga et al., 2018), which establishes a Nordic perspective on the ecocritical debate within children's literature and culture, both belong to the third ecocritical wave. The third ecocritical wave is important relative to balancing the strong Anglo-American dominance that has so far been significant within the field of ecocriticism.

The picturebooks about Kubbe have been analysed using a posthuman lens elsewhere, with a focus on the plant-human hybridity of this character (Guanio-Uluru, 2018). This article examines the digital representation of Kubbe's forest environment in the narrative app *Kubbe Makes Shadow Theatre*, which is read as a representation of a specifically Norwegian and Nordic flora and fauna. Consequently, the emphasis of the third ecocritical wave, that of attachment to specific localities in dialogue with global concepts of place, is characteristic of the angle pursued here.

Taking a Nordic approach, this article draws on the Nature in Culture matrix (see fig. 2), the methodological matrix for ecocritical analysis of children's texts and cultures developed by
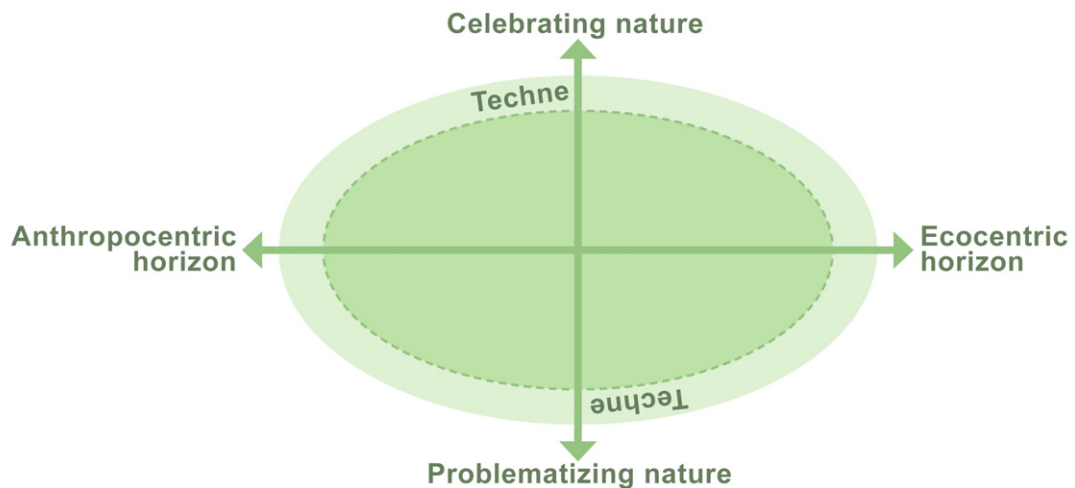
Fig. 2
The Nature in Culture Matrix. Reprinted with permission from NaChiLitCul.

the research group "Nature in Children's Literature and Culture" (NaChiLitCul) based at the Western Norway University of Applied Sciences (Goga et al. 2018, p. 5).

The matrix is founded on extensive reading of ecocritical theory and aids the discussion of ecocritical concepts relative to children's and young adult texts and cultures. The vertical axis expresses a continuum between a 'nature celebrating' horizon – grounded in the Romantic notion of the unity of nature and child and the pedagogical tradition after Jean-Jacques Rousseau – and a 'nature problematizing' horizon where this close relationship and identification between the figures of nature and child is interrogated and questioned. The horizontal axis represents a span between an anthropocentric or 'human-centred' horizon and an ecocentric or 'ecosphere-centred' horizon (for a detailed explanation of these axes, see Goga et al. 2018, p. 12-13). The focus of the interrogation in this article is the dimension of *techne* circumscribing the matrix, which brings attention to nature representations as intentionally shaped and crafted artifacts. The concept of techne is appropriated from Ancient Greek philosophy and inspired by Tom Boellstorff's argument that we are currently living in the 'Age of Techne' (2010, p. 203)

where we have the technological means to intentionally craft ourselves, the natural world and our society in increasingly powerful ways. In the matrix, the concept of techne is a reminder that representations of nature, such as the one encountered in *Kubbe Makes Shadow Theatre,* are human cultural artifacts and also mediations. Consequently, techne calls attention to the technological aspects of nature mediation and representation.

Using the Nature in Culture matrix, Ture Schwebs (2018) has discussed the apps *The Artifacts* (2012) and *Tavs* (2013) with a reference to the dimension of techne (p. 278). More specifically, Schwebs mentions three instances pertaining to the techne dimension of these two apps. Firstly, he argues that in a scene in *The Artifacts,* where the reader may move a vista of the Orion Nebula using the iPad's accelerometer, this mechanism foregrounds 'how the representation of nature is manufactured' (Schwebs, 2018, p. 281). Secondly, he draws on Ayoe Quist Henkel's (2015) discussion of Jay David Bolter and Richard Grusin's (2000) concepts of *transparent immediacy* (representation that seeks to make the medium invisible) and *hypermediacy* (representation that reminds the reader that the message is mediated by drawing attention to medium specific features), arguing that the acti-

vation of hotspots in the apps is a form of reader interactivity that leads to enhanced immersion in the apps' story world (Schwebs, 2018, p. 284). Thus he considers such hotspots part of the techne dimension, or mediation, of apps. Lastly, he refers to the choice of refraining from organising the opening screen of *Tavs* as a hypertext as 'a *techne* choice' (Schwebs 2018, p. 288).

Building on the analytical framework developed by the research group NaChiLitCul, this article continues the investigation of how the representation of nature is mediated in the narrative app format. While Schwebs reads the landscapes of *The Artifacts* and *Tavs* in terms of what Gerrard calls the 'large scale metaphors' (2012, p. 8) of the wilderness and the pastoral, the landscapes of *Kubbe Makes Shadow Theatre* are here read as mediations of a local landscape facilitated by the app's various modes, with an emphasis on visual representation, clicker options, soundscapes and verbal narration. Thus mediation or techne is foregrounded in the analysis, which draws in particular on Espen Aarseth's concept *cybertext* (1997) to discuss the organisation of the text, on Lev Manovich's (2013) terms *media hybridity* and *deep remixability* to argue that the app mixes aesthetic repertoires form across the arts, and on the concept of multimodality to discuss the ecocritical potential of the app's various semiotic modes. Narrative apps have been approached through a diverse selection of theoretical lenses. This article draws on terminology specifically developed to discuss digital media, since its emphasis is on the technological mediation of the nature representation in *Kubbe Makes Shadow Theatre* – its techne. The following section clarifies the choice of analytical terminology.

ON THE ANALYSIS OF CHILDREN'S STORY APPS: RESEARCH TERMINOLOGY

Multiple perspectives have been applied in the analysis of children's apps. Both Celia Turrión (2014) and Ghada Al-Yaquout & Maria Nikolajeva (2015) revisit picturebook theory to discuss and describe digital apps. Schwebs (2014) focuses on the aesthetic affordances of apps, drawing on Hans Georg Gadamer's discussion of aesthetic experiences as situated, (taking place in a given time and space) and on James Gibson's term 'affordance', which is also used in social semiotics theory. Betty Sargeant (2015) discusses the impact of digital computation on the picturebook, with a focus on 'general principles involved in children's digital picturebook design' (p. 464), while Ayoe Quist Henkel (2015) combines a media-critical approach (drawing on Bolter and Grusin 2000) with an art-critical and literary approach to discuss the intermediality of apps. In a later article, Henkel (2016) explores the materiality of literary apps for children with the help of N. Katherine Hayles's discussions of the materiality of literature and a framework drawn from cultural theory on materiality ('the materiality turn'). Yet another approach is chosen by Lisa Nagel (2017), who draws on theatre studies and Wilmar Seuter's concept of theatrical event to discuss 'the interactive features of the app' (1).

While Aarseth's concept of cybertext is frequently mentioned in passing by researchers of children's literature discussing apps (see for instance Turrión 2014, Stichnothe 2014, Henkel 2015, Henkel 2016), the most thorough and systematic account of this concept within the field of children's literature so far is by Yan Zheng (2018), who draws on Aarseth's concept to formulate her theory of *the story telling machine*. In her discussion of the strengths and weaknesses of cybertext theory relative to narrative apps, Zheng notes that the cybertext perspective facilitates analysis of the mechanical workings of (a wide scope of) texts, but does not seem as suitable to the study of textual meaning and textual aesthetics (2018, p. 115–16). Since both perspectives are important to my argument here, I combine Aarseth's cybertext theory with the concept of multimodality to discuss the textual mechanics and the textual meaning of *Kubbe Makes Shadow Theatre*.

The concept from cybertext theory most frequently mentioned in the discussion of literary apps for children is Aarseth's term *non-trivial*. Turrión refers to Aarseth's term (2014, p. 2) but does not define it. Stichnothe (2014) reads *cyber-*

text as a text that 'requires the reader's effort to become an artistic product/text' (p. 1), and notes that the concept *non-trivial* is rather vague. Henkel (2016) too mentions Aarseth's 'non-trivial reading paths', interpreting these as manifesting in texts in which readers 'sometimes join in the decisions about what will happen and when' (p. 9). Zheng (2016) considers selective page-turning an example of 'non-trivial effort' (footnote 2, p. 63). A clarification of these concepts as they pertain to the analysis of narrative apps for children is thus important to this analysis.

Aarseth defines ergodic literature, to which cybertexts pertain, thus: 'In ergodic literature, nontrivial effort is required to allow the reader to transverse the text' (1997, p. 1). The key to deciphering this definition is offered by way of a negation: ergodic literature is that which non-ergodic literature is not: in non-ergodic literature 'the effort to traverse the text is trivial, with no extranoematic responsibilities placed on the reader except (for example) eye movement and the periodic or arbitrary turning of pages' (Aarseth 1997, p. 1–2). The examples offered for 'extranoematic' (that is: that which occurs outside the confines of human thought), indicates that Aarseth is contrasting the 'nontrivial effort' of ergodic literature with reading (characterised by eye-movement and page turning, where the reading activity occurs 'inside the confines of human thought'). To the extent to which a text places 'extranoematic responsibilities' on its reader, it is thus ergodic, requiring the reader to perform extranoematic labour in the transversal of the text.

Working to clarify Aarseth's terminology, Zheng establishes that 'the whole cybertext theory mainly considers physical efforts required from the cybertext operator' (2018, p. 119). She thus argues that 'the term "extranoematic" may be replaced by "physical", and "nontrivial effort" by "selective physical movement/effort"' (2018, p. 120). In my view, a cybertext user's 'nontrivial' transversal of a text also implies a degree of interpretation and choice on the reader's part, and thus cannot be considered a purely physical exercise. This is indicated by Aarseth's formulation '…the user

of cybertext *also* performs in an extranoematic sense' (1997, p. 1). However, I read Zheng's term 'selective' as an acknowledgement of this interpretive aspect of 'nontrivial effort' and thus adopt Zheng's definition of nontrivial effort as 'selective physical movement/effort' here.

To define cybertext, Aarseth distinguishes between a reader and a player. A cybertext reader '*is* a player, a gambler; the cybertext *is* a game-world or world-game, it *is* possible to explore, get lost and discover secret paths in these texts, not metaphorically, but *through the topological structures of the textual machinery*' (1997, p. 4, my emphasis). It is attention to 'the topological structures of the textual machinery' that allows me to identify a new performance mode, the Ambient mode, as ecocritically significant in *Kubbe Makes Shadow Theatre*, and thus the concept of cybertext is important here.

Stichnothe argues that 'Aarseth's textonomy of the cybertext can only partially be applied to book apps' (2014, p. 2). To validate this claim, Stichnothe mentions in particular the cybertext quality of 'transiency' (2014, p. 2). In a transient text, 'the mere passing of the user's time causes scriptons to appear', while intransient texts 'do nothing unless activated by the user' (Aarseth 1997, p. 63). *Scriptons* is a term coined by Aarseth to denote information, in the form of a 'string of signs' as they appear to readers (1997, p. 62). He distinguishes scriptons from strings of signs 'as they exist in the text', which he terms *textons* (Aarseth 1997, p. 62). In order to clarify their difference, Aarseth uses the example of Raymond Queneau's 'sonnet machine', where the user folds lines in the book to 'compose' sonnets: there are only 140 textons, but these combine into 100,000,000,000,000 possible scriptons (1997, p. 62). Through a *traversal function*, scriptons are 'revealed or generated from textons and presented to the user of the text' (ibid). The cybertext thus comprises a mechanism that multiplies scriptons on the basis of textons. In this way, a limited semiotic repertoire combines into multiple potential meanings. In this sense, cybertexts are like grammar, which organises expression (language) from a limited set of variables (the alpha-

bet). Aarseth's textonomy of the cybertext informs this discussion of the textual organization of *Kubbe Makes Shadow Theatre*.

The story app about *Kubbe* is an example of what Lev Manovich (2013) terms *media hybridity*, which, according to Manovich, is a hallmark of contemporary media, in which 'the techniques and tools of computer animation, live cinematography, graphic design, 2D animation, typography, painting and drawing can interact, generating new hybrids' (2013, p. 267). Furthermore, Manovich suggests that while remixes of content from different media are common in moving-image products today (leading to analyses of intertextuality in discussions of the aesthetics of narrative apps), the essence of media hybridity is *deep remixability*; that is, designers do not only remix content from different media but also 'their fundamental techniques, working methods, and ways of representation and expression' (2013, p. 268). Arguably, the aesthetics of *Kubbe Makes Shadow Theatre* is a result of such 'deep remixing', as it combines the languages of cinematography, animation, computer games, graphic design, typography and drawing to create a compounded 'hybrid' experience. Thus, this article draws on Manovich's concept of deep remixability to discuss the aesthetic repertoire of *Kubbe Makes Shadow Theatre*.

The ecocritical analysis following the medial discussion of the app is broadly structured in terms of modes, in a reading of the app as a multimodal text. *Mulitimodality* is used here in a fundamental sense to denote 'the coexistence of more than one semiotic mode within a given context' (Gibbons 2012, p. 8). Particular attention is paid to how the visual mode, the sound, the clicker options and the verbal narration each contribute to the representation of nature in *Kubbe Makes Shadow Theatre*.

KUBBE MAKES SHADOW THEATRE AS CYBERTEXT AND AS MEDIAL HYBRID

Viewing *Kubbe Makes Shadow Theatre* as a cybertext focuses attention towards the app's textual organisation, and towards how it performs as a 'textual machine'. To the app's user,

the app's organisation is mainly discernible in terms of the choice of performance modes that it offers. Ghada Al-Yaquot and Maria Nikolajeva have identified the performance modes Autoplay, Read to Me and Read Myself as typical features of picturebook apps, the first two of which they describe thus:

> In Autoplay and Read to Me, the text is narrated with words highlighted while they are read. The difference between Autoplay and Read to Me is that the latter demands swiping between screens while Autoplay moves from screen to screen automatically. Thus, the Read to Me mode allows the user more agency, to stay on the screen and explore it further by tapping various objects, causing the words to appear on the screen, be read aloud, or both. (2015, p. 6)

The above description calls attention to Stichnothe's comment that the 'read to-me mode' is the closest thing to a transient text she has encountered in a children's book app (2014, p. 12). As we recall, in a transient text, 'the mere passing of the user's time causes scriptons to appear' (Aarseth 1997, p. 63), suggesting that a transient text presents its user with narrative content without any effort on the user's part. When read in Autoplay, book apps for children are potentially such transient texts, where scriptons appear without user activity. The Read to Me mode, as described by Al-Yaquot and Nikolajeva, allows for greater user agency in calling forth scriptons through exploration ('causing words to appear on the screen'). In a cybertext, the level of intransience is correlated with the degree of user agency, suggesting that the Read to Me mode, as described by Al-Yaquot and Nikolajeva, offers a degree of intransience. Stichnothe's argument that most book apps for children are intransient texts rests on the observation that in such apps the reading usually can be stopped and modes switched (2014, p. 2), and this is indeed the case in *Kubbe Makes Shadow Theatre*. While *Kubbe Makes Shadow Theatre* may run independently of the user in Autoplay, much like a film sequence that requires no interaction on the user's part, the

user may still select whether to run the app with or without the narration and the speech bubbles carrying the verbal text. S/he thus retains a degree of agency in relation to the app's performance output. Furthermore, a menu of reading modes is accessible to the user throughout every scene by swiping from the bottom of the page and upward, a feature that allows the user to change the app's setting even within a scene by turning on or off a) the narrator's voice, b) the speech bubbles and c) the Autoplay mode. Consequently, *Kubbe Makes Shadow Theatre* functions like a flexible 'textual machine' allowing for a great deal of user control over the scriptons that are activated or muted in every sequence, thus producing a vast number of potential semiotic sequences where the 'traversal function' is the ability to engage or disengage the textual machine's various semiotic modes. While some readers may spend little time exploring *Kubbe Makes Shadow Theatre* as a textual machine, the consistently available menu of modes invites the curious or creative reader to 'assemble' and 'de-assemble' the app's various semiotic modes, and thus to explore both how they perform together and how they function apart. In this sense, *Kubbe Makes Shadow Theatre* is a semiotic 'world game'. The extent to which the app's user activates and de-activates these modes, through 'selective physical effort', determines the degree of intransience of a given text traversal.

Al-Yaquot and Nikolajeva fail to provide any definition of the Read Myself mode apart from noting that although it may seem closest to a book, 'it can offer a high degree of interactivity' (2015, p. 6). While not technically specific, Al-Yaquot and Nikolajeva describe various instances of what they term interactivity: 'speech balloons appear when you tap the characters', a robin provides additional comments to the narrative, the main character prompts reader actions (2015, p. 6) – all of which coincide with what Zhen terms 'the commanding-executing participatory feature' (2018, p. 95).[2] The predominance of this feature should hardly be surprising, considering that the basis of apps, as software, is a programming language made up of such 'command-execute' scripts.

While *Kubbe Makes Shadow Theatre* may function in accordance with the performance modes identified by Al-Yaquot and Nikolajeva, this app has an additional performance mode, which here is termed the Ambient mode. If both the verbal narration (in the Read to Me mode) and the speech bubbles (in the Read Myself mode) are switched off, the user is left with a sequence of visuals with an ambient soundtrack: the Ambient mode. This option foregrounds the app's forest environment, demonstrating that the setting expands on the verbal narrative but that the visuals do not carry the story on their own. Rather the relationship between the visual and verbal narrative in the app is of the kind that Maria Nikolajeva and Carol Scott term *enhancing* when it occurs in picturebooks, where the verbal narrative depends on the visual narrative for the full realisation of the story (2001, p. 12). What I want to argue here is that the Ambient performance mode, which may be set on the app's opening screen, as well as the opportunities in the app's traversal function allowing for the assembling and de-assembling of the app's semiotic modes in the course of the reading, are both techne features inviting an ecocritical reading of the app since they call attention to *Kubbe Makes Shadow Theatre* as a constructed, or variously assembled, representation of a forest environment.

According to Aarseth, 'when you read from a cybertext, you are constantly reminded of inaccessible strategies and paths not taken, voices not heard. Each decision will make some parts of the text more, and others less, accessible' (1997, p. 3). A reading of *Kubbe Makes Shadow Theatre* in the Ambient mode makes the verbal narration, which is essential in the Read to Me and Read Myself modes, inaccessible to the reader, who is left to decipher a series of visuals much like a child perusing a picturebook before s/he can read. The difference between such a non-verbal picturebook reading and a reading of *Kubbe Makes Shadow Theatre* in the Ambient mode is that the app has an ambient or atmospheric soundtrack, which cannot be switched off within the app itself (but which of course can be muted using the iPad's regular volume controls). In

addition, the point of view in the app is programmed to mimic camera movement, thus exerting a degree of control over the app user's point of view. This is evident for instance in the app's opening scene, which is a long tracking shot moving the user's point of view along between the trees in Kubbe's forest domain. Thus, while the Ambient mode mutes the verbal narrative, it adds atmospheric sound as well as a sense of motion to Johnsen's recognisable drawings of Kubbe and his surroundings.

To describe the opening track of *Kubbe Makes Shadow Theatre* by employing Manovich's term deep remixability, its aesthetics is indebted to the medium of film. This is signalled as early as on the opening screen, where the Autoplay reading mode is indicated by a reel of film that revolves if activated. David Bolter and Richard Grusin (2000, p. 28–9) have pointed out that while the user's point of view is fixed in painting and photography (where the image is composed, or 'framed' from a certain perspective, as is also the case in the picturebook stories about Kubbe), in film, TV and computer animation the point of view is set in motion, as in the opening shot of *Kubbe Makes Shadow Theatre*. In terms of media aesthetics, the app references the medium of film (specifically in the form of cinematic camera movement and the film reel icon), slide shows (the clicking sound signalling page turns), theatre (Kubbe stages and performs live shadow theatre), digital games (with its interactive clicker choices), and the previous paper-based picturebooks about Kubbe (through visual style (drawing) and via references to the book convention of page turning as part of the app's interactive modality). As noted by Manovich, such a remixing of media aesthetic repertoires is characteristic of digital software. It is the bringing together of these aesthetic repertoires into one aesthetic product that makes the analysis of narrative apps so multi-faceted, thus calling for a number of distinct theoretical approaches.

Read as a multimodal text, *Kubbe Makes Shadow Theatre* combines verbal text, sound, animation, still images and music to represent Kubbe and his forest environment. The following ecocritical reading of *Kubbe Makes Shadow*

Theatre picks up on the app's invitation to perform semiotic 'world play' by exploring how each semiotic mode contributes to the overall representation of nature, with an emphasis on perusal in the Ambient mode. It does not pretend to be a typical child reader's reading (if such a thing exists) of the app, but is rather a reflection (for adults) on how the digital 'co-hosting' of the app's different semiotic modes diversify nature representation in the narrative app.

MEDIATED NATURE IN KUBBE MAKES SHADOW THEATRE

In terms of narrative structure, *Kubbe Makes Shadow Theatre* has twenty-two sections or 'chapters'. Sections one to ten take place during Kubbe's and Grandma's forest picnic, with a historical 'documentary' about shadow theatre played out within the ninth section. Sections eleven to fourteen show Kubbe's preparations for his shadow theatre performance, while sections fifteen to nineteen deal with his attempt to stage his performance after dark and his search for a light source. Section twenty contains the actual shadow theatre performance, a diverting version of Little Red Riding Hood, and the final two sections feature the wind-down after the performance, at Kubbe's forest house. Each section functions as a short chapter in the story's progression. The same three locations reappear in different sections: Kubbe's house, the stream next to which Kubbe and Grandma have their picnic, and the theatre stage in the forest.

The fact that the screen is locked to the horizontal format during the playing of the app signals that landscape is an important feature of the storytelling in this app. The long pan-like tracking shot of the opening sequence underlines this horizontal emphasis. Unlike in the picturebooks about Kubbe, which also usually include references to urban spaces, the story line of *Kubbe Makes Shadow Theatre* is set entirely in the woods. The only exception to this occurs in the 'paper-clip documentary' section in which Grandma explains the historical origins of shadow theatre: this section is set in the palace of a Chinese emperor. It ends with a shadow image

of the globe circumscribed by signal monuments from different nations, such as the Eiffel Tower, London Bridge and the Acropolis: a visualisation of the global cultural importance of the tradition of shadow theatre. The 'documentary' section differs both visually and aurally from the rest of the story, its soundtrack presenting the reader with traditional 'Chinese' pentatonic music, while its visuals resemble paper clippings, quite distinct from the ink-lined drawings in the rest of the story. Furthermore, it is the only section in the app that portrays distinctly human characters, framing the idea of theatre as a human cultural phenomenon. In the remainder of the app, Kubbe moves in a forest environment devoid of human presence but replete with the artefacts of a modern consumer culture. The spectators of his shadow play performance are an assortment of tree-like beings that are more or less anthropomorphic but never explicitly human (see fig. 3).

The visual representation of nature in the app relies on Johnsen's characteristic drawings and continues the visual style developed in the picturebooks about Kubbe. A closer examination of the app's fauna reveals that the depicted animals are an eclectic mix of species that are all part of the Norwegian fauna. In the long opening tracking shot through the forest, the reader encounters a deer, two red squirrels, a moose, two hares (one of them could be rabbit), a wild boar, a brown bear and two species of bird, one of which resembles an owl. All of these creatures are visible in passing as the virtual 'camera' tracks in a panning motion through the scenery. While part of the Norwegian fauna, wild rabbits and wild boar are rare and not found within the same habitat. The app's representation of fauna is thus not representative in an ecosystems sense.

Most of the trees depicted resemble pine conifers, but animated falling leaves, which occur


Fig. 3
(screen shot): An assortment of creatures attend Kubbe's shadow theatre performance. Reprinted with permission from Åshild Kanstad Johnsen.

on most spreads, indicate that the forest also has deciduous species. The app's forest habitat further displays evidence both of old growth and of logging in the form of tree stumps. Flowers seem to be limited to a few species: a yellow-leaved, a turquoise-leaved and a red-leaved variety of the same plant shape that reappear in various sections. Some sections also contain long grasses. Clearly, the representation of flora is guided more by aesthetics than by any attempt at botanical accuracy. Furthermore, there is a snow-capped mountain in the distance and a meandering river flowing though the scene, suggestive of a pastoral idyll. Hidden among the trees are a number of anthropomorphic tree trunks and several tree-like creatures, in a blurring of the plant-human species boundary that is characteristic also of the app's protagonist, Kubbe.

While part of the fauna depicted in *Kubbe Makes Shadow Theatre* allows for the identification of well-known Norwegian species, the app's fireflies, which Kubbe summons in order to perform shadow theatre after dark, are less naturalistic. Zoologically, fireflies have large eyes. Thus, the app's specimens with their round heads and small eyes (see fig. 4) are not identifiable as fireflies except through the information provided by the verbal narration. Although there are many species of luminous insects worldwide, the term firefly usually refers to the bright South American *Pyrophorus Pteroptyx*. The only Norwegian species of luminous beetle is the *Lampyris noctiluca*, the luminous gender of which is the larva-like female that lacks wings (Ottesen, 2012) and so this cannot be the model for the fireflies represented in *Kubbe Makes Shadow Theatre*. Apparently, 38 *Pyrophorus Pteroptyx* together will emit approximately the same amount of light as a candle (Ottesen, 2012), rendering them a feasible light source for Kubbe's forest theatre. In its zoological inaccuracy, the app's rendition of the firefly is metonymic, using its associative trait of luminosity to signify the species.

The presence of the fireflies introduces incongruence into the representation of Kubbe's local environment. Thriving in a tropical climate, and
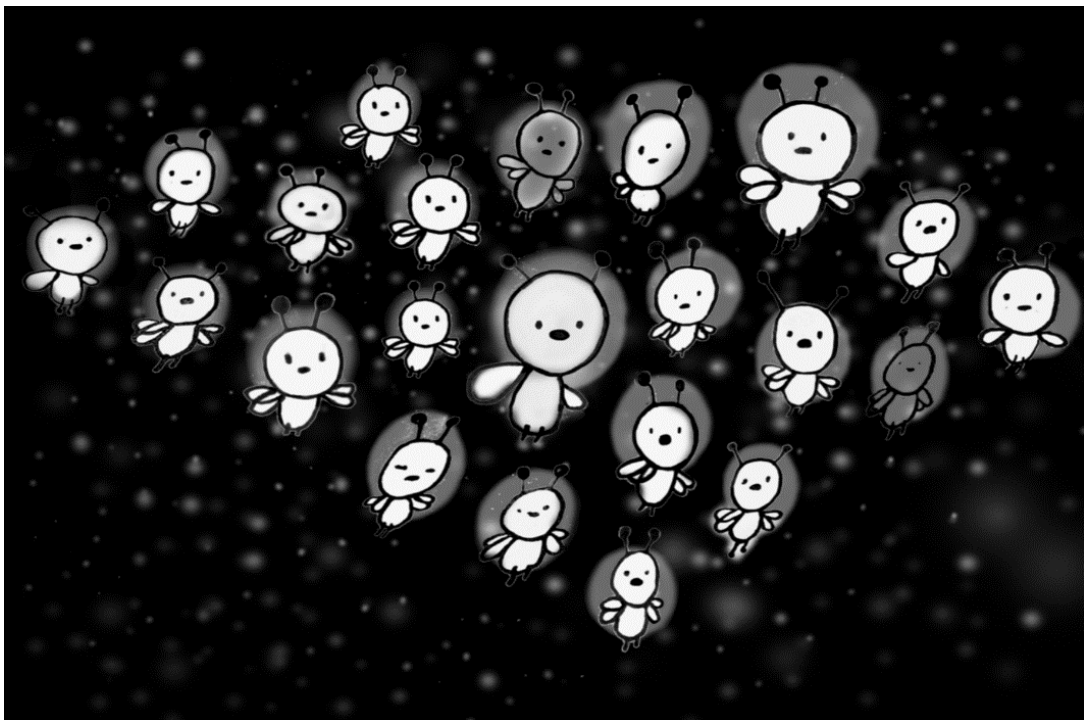
Fig. 4
(screen shot): The fireflies conjured by Kubbe. Reprinted with permission from Åshild Kanstad Johnsen.

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sketchily rendered, the fireflies are at odds with the pine forests, the snow-capped mountain and the otherwise identifiably Norwegian or Nordic fauna that are part of the app's natural scenery. They thus constitute a surprise element[3] and foreground how Kubbe's forest domain is an imaginative construction on the part of the author. The various anthropomorphic forest beings that populate Kubbe's forest further recall forest myths and the European fairytale tradition (see Maitland, 2012). Thus, more than a faithful rendering of a natural habitat or an actual ecosystem, Kubbe's forest domain is fictional and fabulous, even as, judging from the majority of its fauna, its representation is inspired by Johnson's native Norwegian environment.

The mode of sound, which is not part of the description of Kubbe's world in the picturebook format, functions in the app to 'authenticate' the forest setting. Along with a 'loop' of harmonious music, the app's soundtrack is comprised of natural sounds like birdsong and flowing water, which are likely recordings. Such recorded sounds accompany most sections and serve various functions. The soundtrack to the opening sequence featuring a variety of birdsong aurally suggests a wider range of birds than the two species depicted. Here, the soundtrack works to diversify the more simplistic visual representation of birdlife.

With its mix of 'true' natural sounds, the app's soundtrack brings a sense of immediacy: the sound of the stream and the chirping of birds invokes a real forest, aided by the app reader's familiarity with natural environments. The soundtrack's birdcalls are comprised of the calls of several different species, making individual species hard to identify for a non-expert. Certainly, one call closely resembles that of the *fringilla coelebs*[4], one of the more common species of finch in Norway. The forest sounds in *Kubbe Makes Shadow Theatre* thus add a realistic dimension to the app's presentation of the natural environment and build the visual suggestion of biodiversity in the opening shot. The call of the Eurasian elk depicted in the second section, which can be clicker-activated, closely resembles the natural call of the species, further suggesting that the calls in the app are recordings of actual fauna. In section fourteen, the reader can hear the sound of buzzing flies and mosquitos – as well as the sound of someone hammering on wood, an addition which adds a narrative element to the sounds' ambient function.

Ontologically speaking, the app's soundtrack is to an extent contrapuntal to the app's visual portrayal of nature. While the soundtrack includes recordings of natural sounds, Johnson's drawings rely more clearly on cultural and mythological elements. Consequently, the app combines real-life and storied representations of nature, a juxtaposition facilitated by the deep remixability properties of the digital medium. Arguably, this combination of imaginative drawings with real world sounds offers a richer, more complex experience of Kubbe's environment than do the picturebooks about him. The complexity arises as the app's representation of nature invites both immediacy and reflective distance since the app allows for the co-presence of recordings of both natural sounds and music, of written language, of the human voice and of imaginative drawings.

The app further adds movement and animation to its representation of Kubbe's environment. Almost every section features animated effects, such as falling leaves, moving clouds and pecking birds, but only two sections have clickable, user-activated animations: the Eurasian elk that can be pressed to emit a roar, and a selection of musical instruments that play when clicker-activated (their notes are indicated visually to prompt the interaction – an example blurring Schweb's (2014) distinction between 'veiling' and 'unveiling' of app content). The Eurasian elk will appear in different places in the image in different perusals. The app reader's opportunities to engage with what Zheng terms 'the commanding-executing participatory feature' are consequently limited, with intransient options consisting mainly in the possibilities for the assembling and disassembling of the app's semiotic modes rather than in clicker-activation of the story content.

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Analysing the app's verbal narrative highlights how much of Kubbe's environment is described through the app's visual and aural modes. The text (which is also vocalised by Kim Haugen) mentions that Kubbe lives in a wooden house in the forest. It describes the day of the picnic as beautiful and the place by the stream as a nice place to sit. The element of water is mentioned, and Kubbe talks with his grandmother about clouds, the sun and how the sun casts shadows. The word 'forest' is repeated several times; people **from** the forest come to watch his performance, which is **in** the forest. Due to the topic of shadow theatre, sun, light and shadow are referred to repeatedly. However, the only two animal species mentioned in the verbal text are fireflies – and the wolf in *Little Red Riding Hood.* As the only species of plant, trees are mentioned once. True to the affordances of the verbal and visual modes, the verbal narration is chiefly concerned with what happens and when (and why), whereas the visuals establish a sense of space. The semiotic mode of sound is ecocritically significant, since it provides true-to-nature representation of the forest environment's depicted wildlife. Due in large part to the added mode of sound, the representation of nature is more complex in the story app than in the picturebooks about Kubbe, since the playback of authentic forest sounds adds a realistic layer to the storied and fabulistic representation of Kubbe's forest that dominates in the picturebooks about him and in the app's visual mode.

The app's textual organisation, with the incorporation of the Ambient performance mode, adds to the app's ecocritical potential in two main ways. Firstly, by organising the app as a 'textual machine' where the user may toggle the app's performance modes within each scene, the app calls attention to itself as a medium (what Bolter and Grusin term 'hypermediacy') while also foregrounding how its representation of nature is constructed and mediated *and* inviting the reader to both partake in, and play with, this medial construction. In this sense, the app highlights the techne dimension in the Nature in Culture matrix. Secondly, the Ambient performance mode, which allows for a perusal of the app with a selective emphasis on Kubbe's forest environment, entails a muting of the narrative about Kubbe's cultural productivity that is prominent both in the app's regular performance modes and in the picturebook stories about him, thus shifting the app's nature representation from an anthropocentric to a more biocentric emphasis. This biocentric dimension is highlighted through the inclusion of recordings of actual forest sounds into the app's soundtrack, giving actual nature a 'voice' in the narrative, even as these recordings remain framed and 'remixed' by human agents.

NOTES

1 The stories about Kubbe have spread to Sweden, Denmark, France, The Netherlands, Germany, Italy, Poland, Turkey, Russia, China, Japan, Korea and Taiwan. See: http://www.gyldendal.no/Forfattere/Johnsen-AAshild-Kanstad.

2 In her thorough discussion of the much-used concept of interactivity, Zheng argues, on the basis of a rather complex definition, that none of the apps she has reviewed are 'interactive' but that quite a few are 'participatory', displaying the 'commanding-executing participatory feature' (2018, p. 94).

3 From an ecocritical perspective, the fireflies in Kubbe's pine forest also actualise the debate around introduced species – a debate that usually does not acknowledge the biodiversity increase that such species represent (Heise, 2016, p. 29).

4 The finch is identifiable in section four, where Kubbe chases his shadow.

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