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Storytelling Mechanism 2.0: Another Perspective on Digital Literature

This paper offers a discussion on how narrative texts work mechanically, based on the storytelling mechanism theory constructed by Yan Zheng (2016) and cybertext theory introduced by Espen Aarseth (1997). It agrees with Zheng's findings that there are no intrinsic differences between digital literature and literature presented on other platforms in terms of their mechanical textual behaviours. However, this paper also points out the limitations of Zheng's theory in its previous stage. To fix the problem, this paper differentiates the storytelling mechanism theory from its theoretical origin, cybertext theory, avoids the problems found in both theories, and further develops Zheng's typology of narrative texts to include 35 logical questions that can provide more meticulous views to enquire about a narrative text. Moreover, this paper constructs a map that can be used to demonstrate visually how a narrative text is produced with collaborative efforts from the three elements in the storytelling mechanism.

Keywords: narrative apps, storytelling mechanism, cybertext theory, typology, media, collaborative efforts

While studies of children's literature and of other kinds of literature implicitly divide themselves based on the platforms of the text, such as digital and non-digital, the appearance of the *storytelling mechanism theory* (Zheng 2016) seems to be a radical move that challenges our traditional view of the production of a narrative.

Briefly, the storytelling mechanism theory considers a narrative (in all kinds of formats, such as visual, verbal and audio ones) as a result of a mechanical production of a textual machine.[1] This machine is composed of three elements: the *narrative content*

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[1] In brief, the storytelling mechanism theory considers all kinds of literary phenomena as texts, ranging from codices to computer programmes and beyond. A text is considered as an actual machine that produces certain types of narrative. This production is mechanical in the sense that the narrative is constructed out of a physical collaboration between the narrative content, the medium and the interpreter. For details, see Zheng (2016).

(stories intended to be told), the *medium*[2] (a physical agency, which can be stable or unstable, to directly present the narrative content), and the *interpreter* (the person receiving and interpreting the narrative content). The mechanism contains two layers, a mechanical layer where the arrangement and the formation of signs occur, and an interpretative layer which involves meaning-making. The two layers are considered to have mutual influence on each other. A key concept in the theory is the *mechanical textual behaviour* that refers to "the actual arrangement of signs [in] the medium of storytelling, and such an arrangement is decided by the nature of the medium while it is influencing and influenced by the interpreter's act upon the narrative content via the medium" (Zheng 2016: 60). A typology of narrative texts based on their mechanical textual behaviour constitutes a crucial part of the theory. This typology consists of 11 logical questions. By answering yes or no to each question, one can gain a description of any type of narrative text based on a stable medium regarding how the narrative is generated out of the storytelling mechanism.

This theory suggests that there are no fundamental differences between digital and non-digital literature in terms of their mechanical textual behaviours (however, this is not to say that there are no significant differences in terms of the interpreter's experiences). For example, from the perspective of how signs are generated and arranged in the medium, a pop-up picturebook and a narrative app[3] may have more similarities than the pop-up and a novel in print forms do. This perspective breaks the barrier between the studies of digital and non-digital texts, and creates possibilities for a shared discourse between the two studies.

However, the theory in the current form has two limitations: firstly, there is no clear explanation of the theory's position in relation to the cybertext theory on which it is built. Although Zheng (2016) mentions briefly that her theory considers all types of signs while cybertext theory only considers verbal signs, and her medium and the cybertextual medium are different as the medium in the storytelling mechanism is considered as "a physical agency of storytelling while the cybertextual medium refers to a material component of the cybertext" (Zheng 2016: 62), such differences are not intrinsically distinctive. This is not to say that the storytelling mechanism theory is not of any significance as it does offer an effective method to study narrative apps and other digital texts for children, but there is a danger of reinventing the wheel if the theory is not scrutinised in relation to other similar theories. Secondly, the rationale of the typology is not clear, i.e. there is no clear reason offered for constructing the 11 questions as such, and certain terms in the 11 criteria require further explanation. This limitation may create unnecessary difficulties for one to understand or to use the theory.

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[2]   For a detailed definition of the medium, see Zheng (2016: 60–62).

[3]   This paper prefers to use "narrative app" instead of "story app". This is because in narratology there are distinctive differences between *narrative* and *story*. Based on different schools of opinions in narratology, a narrative consists either of "story" (what happens) and "discourse" (how the story is told) (Chatman 1975), or of "fabula" (what happens) and "story" (how the fabula is told) (Bal and Boheemen-Saaf 2009). The aspect of storytelling in the apps corresponds with "narrative" from the perspective of narratology as it concerns both what is presented and how it is presented. To avoid confusion, this paper uses narrative app to address the subject of study.

Thus, with the aim of evaluating and improving the theory of the storytelling mechanism, this paper will highlight the theory's significant theoretical stance by comparing it with cybertext theory in terms of their perspectives, methods, and analytical power, and reconstruct the theory to make better use of it for the studies of (children's) literature, particularly for the understanding of digital texts.

The context

As Zheng (2016) suggests, the mechanical layer of the storytelling mechanism is the crucial factor that influences how a text is constructed and interpreted, i.e. the nature of the medium has fundamental influences on the possibilities of the arrangements and the perceptions of signs. Thus, it seems that understanding the nature of the medium is a key to understanding how storytelling works.

Regarding the studies of media functions, so far most of the research and theories have taken a similar approach, that is, they study the functions of a particular medium or a group of media based on observations on existing and possible media behaviours. For example, narratology (e.g. Bal and Boheemen-Saaf 2009; Chatman 1975) and picturebook theory (e.g. Nikolajeva and Scott 2006; Nodelman 1988) were developed based on the observations of the literature on print materials. Although they might be, to some degree, applied to digital (children's) literature (e.g. Ryan 2014), they are not capable of dealing with the formation and the arrangement of signs other than the meaning of the signs in digital texts. Game studies (e.g. Raessens and Goldstein 2011) and studies on electronic/digital literature (e.g Hayles 2008) are based on works created for digital platforms, and are thus not ready for use for analysing other media behaviours.

In addition, as most of the theoretical approaches regarding storytelling restrict their scopes to a particular medium or a group of media, such approaches, although having unique strengths in understanding thoroughly how particular media function, have two major limitations. The first is that they seem to suggest that the same medium always functions in the same way, while there seem to be fundamental functional differences between different media (e.g. digital and non-digital media), but such an assumption is not justified. The second limitation is that they count on what exists (in media behaviours) rather than on what might be possible, which, as Eskelinen (2012) argues, "seriously undermines their explanatory and analytical power. The cumulative effects of this lack also obscure our understanding of transmediality, media ecology, and digital media" (1), and in this paper's perspective, prevent us from fully exploring the affordances of different media.

Eskelinen's idea of literature and its theories (i.e. poetics) echoes with those of Todorov's (1977) and Genette's (1988). Todorov (1977) defines poetics as "a sum of possible forms: what literature can be rather than what it is" (33), while Genette (1988) specifically argues that (157):

> [...] poetics in general, and narratology in particular, must not limit itself to *accounting for* existing forms or themes. It must also explore the field of what is possible and even

impossible without pausing too long at the frontier, the mapping out of which is not its job.

Although most of the theories we have so far *do* limit themselves to the existing forms, and consequently lack heuristic power for "inventing practice" (ibid. 157), this is not to say that the existing forms are not worth investigating, nor to underestimate the strengths of these theories in their own approaches. Solely from the perspective of exploring the affordances of different media, it seems that the storytelling mechanism theory and its origin, cybertext theory, are more powerful than other theories, as they do not limit themselves to any particular medium and their visions go beyond what a medium can or cannot do, but to the possibilities and even impossibilities of media functions.

Cybertext theory

As the theoretical origin of the storytelling mechanism theory, cybertext theory was developed by Espen Aarseth in the 1990s (1991; 1994; 1997). It studies textual communication at a mechanical level, and not at an interpretative or semantic level. The theory considers a text as a mechanical device consisting of the verbal sign, the material medium and the human operator. This textual machine produces two kinds of signs, *textons* (signs existing in the text) and *scriptons* (signs appearing to the reader),[4] and they may not be the same. The textual machine also contains a traversal function – "the mechanism by which scriptons are revealed or generated from textons and presented to the user of the text" (Aarseth 1997: 62). This traversal function contains seven variables. Here I quote the definitions of the variables in full as they are key concepts for later discussions:

1. *Dynamics*: In a static text, the scriptons are constant; in a dynamic text, the contents of scriptons may change while the number of textons remains fixed (intratextonic dynamics, or IDT), or the number (and content) of textons may vary as well (textonic dynamics, or TDT).
2. *Determinability*: [… A] text is determinate if the adjacent scriptons of every scripton are always the same; if not, the text is indeterminate.
3. *Transiency*: If the mere passing of the user's time causes scriptons to appear, the text is transient; if not, it is intransient.
4. *Perspective*: If the text requires the user to play a strategic role as a character in the world described by the text, then the text's perspective is personal; if not, it is impersonal.

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4   In my understanding, *textons* are information pieces or signs stored in the text. They are the "raw material" which has not been rearranged in any way to show to the operator in the material medium. *Scriptons* are information pieces or signs displayed, arranged or rearranged in the medium to the operator, but do not have to be seen, sensed or understood by the operator. For example, in a flip-flap picturebook, all the signs printed on each page are textons. The combinations of flaps are scriptons because they are signs rearranged to be presented to the reader. For a flip-flap picturebook, the number of its scriptons is greater than the number of textons as the reader can form various combinations with the limited number of flaps.

5. *Access*: If all scriptons of the text are readily available to the user at all times, then the text is random access (typically the codex); if not, then access is controlled.

6. *Linking*: A text may be organised by explicit links for the user to follow, by conditional links that can only be followed if certain conditions are met, or by none of these (no links).

7. *User functions*: Besides the interpretative function of the user, which is present in all texts, the use of some texts may be described in terms of additional functions: the explorative function, in which the user must decide which path to take, and the configurative function, in which scriptons are in part chosen or created by the user. If textons or traversal functions can be (permanently) added to the text, the user function is textonic. If all the decisions a reader makes about a text concern its meaning, then there is only one user function involved, here called interpretation (ibid. 62-64).

Based on the possible values of each variable, (i.e. *Dynamics* has three values, static, IDT and TDT; *determinability*: determinable and indeterminable; *transiency*: transient and intransient; *perspective*: permanent and impermanent; *access*: random and controlled; *linking*: explicit, conditional and none; *user function*: explorative, configurative, interpretative, and textonic), the theorist used a mathematical formula to work out 576 possibilities for value combinations. These possibilities map 576 theoretical media positions in the whole universe of textuality. The theorist believes that any type of texts can be described using the variables in the seven traversal functions. However, this does not mean that all the possibilities can find empirical equivalences as the typology is theoretical.

Apart from what has been introduced about the theory, there are another four important concepts in the discourse of cybertext theory that are adopted explicitly or implicitly by the storytelling mechanism theory. They are *ergodic*, *nonlinear*, *extranoematic* and *nontrivial effort*.

Aarseth (1997) uses "ergodic" to address a special textual behaviour found in some literary texts. A brief definition of ergodic literature is literature where "nontrivial effort is required to allow the reader to traverse the text" (1). However, to understand *nontrivial effort*, one needs to understand *nonlinear* and *extranoematic*.

An ergodic text consists of two basic features: the *nonlinear* and *extranoematic*. Here, the concepts of *linear* and *nonlinear* are not used in the same sense as in literary studies, but are similar to those used in game studies. As common literary concepts, the *linear* and *nonlinear* are usually used to describe a narrative where events are (not) portrayed in chronological order, or where the narrative does (not) follow Aristotle's arc, i.e. a clear beginning, middle and end. However, in cybertext as well as in game studies discourses, the *linear* and *nonlinear* are not often used to address the *content* of the text but to refer to the "shape or structure of the text" (Aarseth 1994: 62), or, in other words, they speak of the *physical path* taken by the operator on her/his way of traversing the text. To cause less confusion, I hereafter refer to such (non)linearity as *structural (non)linearity* to contrast with *narrative (non)linearity*.

A *structurally nonlinear text* is defined by Aarseth as follows (1994: 62):

[It is] an object of verbal communication that is not simply one fixed sequence of letters, words, and sentences but one in which the words or sequence of words may differ from reading to reading because of the shape, conventions, or mechanisms of the text.

Aarseth (1997) further explains in *Cybertext* that a structurally nonlinear text must have "the ability to vary, to produce different courses" (42–43). Although cybertext theory only considers verbal communication, the definition of a structurally nonlinear text can also apply to visual communication. I will hereafter discuss *structural (non) linearity* in the context of both verbal and nonverbal communication.

Due to its convention or mechanism, a *structurally linear text* allows its operator to take one and only one physical path through the whole exploration of the text. For example, the first printed edition of *Alice's Adventure in Wonderland* (Carroll 1865) requires an ideal reader to read from the first page to the last, and thus the reader is only given one physical path to complete the reading. A *structurally nonlinear text* provides more than one path or possibility for the operator to have different experiences (of signs) of a complete narrative. In such texts, the operator is usually required to make one of many choices to proceed with the story. Once one path is taken, the ideal operator is not allowed to go back to explore other paths before finishing the chosen one. Such examples can be seen in both print and digital literature. For example, in the famous work by B.S. Johnson (1969), *The Unfortunates*, every chapter of the book is bound together but all the chapters are loosely bound, so the reader can read the chapters in any order. However, an ideal reader can only choose one sequence to read through the book. If s/he wants to experience another version of the book, s/he has to restart the reading in a different order. As for digital literature, one may see this structural nonlinearity in the narrative app *The Ogress* (La souris qui raconte (version 1.2.0) 2012) where, in the middle of the storytelling, the operator is asked to choose one of three options to keep going (see **Fig. 1**). Each option leads to a path that reaches a different ending of the story.

Structural nonlinearity brings another feature to an ergodic text, that is, the *extranoematic*. Extranoematic is a conglomerate word consisting of extra (outside) and noematic (of a noema, i.e. of mind or thought), meaning something that happens outside the mind. Aarseth (1997) uses *extranoematic* to refer to the physical effort exercised by an operator to traverse the text based on the text's own mechanism or design. When the physical effort is a "selective movement […], a work of physical construction that the various concepts of 'reading' do not account for", and by this selective movement the operator "ha[s] effectuated a semiotic sequence" that constitutes part of the final text, such extranoematic effort is addressed as *nontrivial effort* (1). On the other hand, trivial effort is described by the theorist as the effort "with no extranoematic responsibilities placed on the reader except (for example) eye movement and the periodic or arbitrary turning of pages" (1–2).
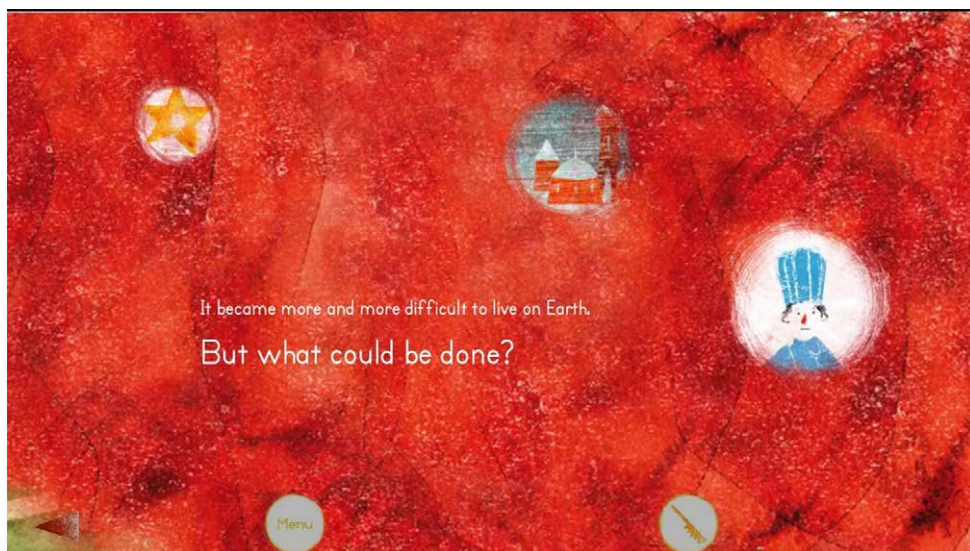
Fig. 1. In this scene of *The Ogress*, there are three icons, a star, houses, and a chef, leading to three different developments of the narrative. The operator needs to tap on one of the three icons to proceed. Once the hyperlink is triggered, the ideal operator cannot go back to explore other possibilities but has to finish the chosen path.

Comparing theories

Both cybertext theory and the storytelling mechanism theory have similar theoretical perspectives that address texts of various media while acknowledging that different media may not have essential functional differences, while the same medium (in terms of its materiality) may arguably perform differently in various cases. However, in terms of their focuses and methods, the two theories are fundamentally different, and so are the degrees of their analytical and heuristic power.

In general, although both theories consider a text as a mechanical device that contains three similar elements, and both theories acknowledge that a narrative is a result of collaborative efforts from the three elements, cybertext theory enquires about the three elements individually without examining the impact they have on one another in the process of producing a narrative, while the storytelling mechanism theory considers both individual behaviours of each element and the relational impact they have on each other in the mechanical production of a narrative.

Specifically, a close reading of the definitions of the seven traversal functions and their values shows that there are no clear logical links or relations built between each two elements although in reality or in theory the three elements cannot work in isolation of each other. Eskelinen (2012) later improves cybertext theory by providing more traversal functions and new values for some traversal functions. However, he adopts the same methodology as Aarseth (1997), and therefore his updated cybertext theory still overlooks the relational impact each element has on the others. This overlook

causes a logical issue in cybertextual typology, as ignoring the relational impact will make it theoretically impossible for some text types to exist in the typology, i.e. the overlook causes inaccuracy in getting text types, which weakens the theory's analytical and heuristic power.

For example, when introducing the four values in *user function*, Aarseth (1997) writes that "the interpretative function of the user [as one of the four values in *user function*…] is present in all texts" (64), which is undoubted. However, this statement poses a problem for the validity of his typology. The theorist gets 576 possibilities of textual communication by multiplying the numbers of values of each traversal function, i.e. 576 = 3 values in *dynamics* × 2 values in *determinability* × 2 values in *transiency* × 2 values in *perspective* × 2 values in *access* × 3 values in *linking* × 4 values in *user functions*. Mathematically speaking, this formula means that there is a large number of textual positions, precisely $3 \times 2 \times 2 \times 2 \times 2 \times 3 \times (4\text{-}1) = 432$, which should not involve an "interpretative function" at all. However, this mathematical analysis of the textual positions contradicts both the theorist's statement and the empirical findings according to which all types of texts should have an interpretative function. In other words, these findings reveal that the actual number of theoretical textual positions based on different traversal functions is much smaller than the one provided by the theorist. Although when establishing a certain classification the result is less important than the criteria, cybertextual criteria do not appear to be logical enough to validate the theory's typological statements.

The storytelling mechanism theory, in contrast, avoids the issue of the text types' repetition as it uses logical enquiries to examine the storytelling mechanism so as to prevent intersections from occurring when sorting texts into different categories. Specifically, Zheng (2016) asks 11 sequential questions about a narrative text. The questions are as follows:

1. Is the medium stable?
2. Are all the signs […] embedded in the text presented to the interpreter via the medium during the moment of the interpreter's traverse?
3. If the answer to question 2 is "yes", are all the signs embedded in the text presented to the interpreter via the medium with the *same arrangement* during different moments of the traverses?
4. If the answer to question 3 is "no", is the *variation* of the arrangement of the signs limited?
5. If the answer to question 2 is "no", do the unpresented signs need to be revealed by the physical operation of the interpreter on the medium?
6. If the answer to question 5 is "yes", does the physical operation involve "non-trivial efforts" from the interpreter?
7. If the answer to question 5 is "yes", during one *complete traverse* of the text, is it possible to reveal all the hidden signs by the physical operation of the ideal interpreter on the medium?

8. If the answer to question 7 is "yes", during one complete traverse of the text, is it possible to reveal all the hidden signs with the *same arrangement* by the physical operation of the ideal interpreter on the medium?

9. If the answer to question 8 is "no", is the *variation* of the arrangement of the signs limited?

10. If the answer to question 7 is "no", is the *arrangement* of the revealed signs [in] the medium the *same* during different traverses of the ideal interpreter?

11. If the answer to question 10 is "no", is the *variation* of the arrangement of the signs limited? (63–64).

In this series of enquiries, starting from the 2nd question, each question is a follow up to the previous one, which reflects a sequence[5] of the mechanical production of a narrative, and which examines the individual behaviours of each element in the storytelling mechanism without overlooking the impact each previous step has on the following one in this textual mechanism. The number of possibilities for textual communication based on this typology might not be as impressive as that of the cybertext theory's, but the criteria and the methodology offered by the storytelling mechanism theory are more logical and therefore can be developed further to offer a more accurate description and analysis of a narrative text.

Although the storytelling mechanism theory in the current form solves the logical issue found in cybertext theory, it still shares similar conceptual issues. In other words, there are some concepts shared by both theories that either lack definition or a clear explanation, which causes confusion for an accurate understanding of the theories.

For example, in the storytelling mechanism theory, there is a concept of "moment of the traverse" that is similar to the cybertextual concept of "readily available", but neither theory explains its exact meaning. Specifically, in cybertext theory, the traversal function of *access* has two values, *random access* and *controlled*. Aarseth (1997) explains that "[i]f all scriptons of the text are readily available to the user at all times, then the text is random access (typically the codex); if not, then access is controlled" (63). However, it is not clear what "readily available" refers to. If it refers to the situation where all scriptons are presented to the human operator at all times, then the accesses to all the codex texts are not random as believed by the theorist because all the scriptons in a printed book are not presented to the reader at all times – the reader needs to turn pages to reveal more scriptons. If "readily available" means that the number of scriptons is fixed, then the idea expressed in this traversal function is similar to that of *dynamics* (the 1st traversal function) where the theorist discusses fixed and unfixed scriptons and textons. In this case, in the total number of 576 textual positions, there would be a great number of textual positions that repeat one another. If "readily available" refers to the situation where traversing the text does not require physical efforts from the human operator, then this traversal function of *access* may make sense, but, in this case, it would be better to use "physical efforts" to clarify the concept of *access*.

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5 The author of this paper does not, in any way, indicate that the sequence presented in the storytelling mechanism is the only sequence through which a narrative can be produced.

The storytelling mechanism theory seems to be aware of the ambiguity reflected in "readily available" as it asks directly if signs are presented to the interpreter during the moment of the traverse and whether such presentation requires the interpreter's physical operation (see questions 2 and 5). However, it brings up a new confusing concept which is "the moment of the traverse". Zheng (2016) does not offer any explanation of the term. Based on the phrasing in questions 2 and 3, it seems that she uses "moment" to refer to the instance of the traversal action, but it is not clear how long can be counted as a "moment of the traverse". However, it is nevertheless a good idea to examine the mechanical production of a narrative in temporal sections because it allows us to have a "micro" view of how narrative texts are constructed. Thus, this paper will follow this idea to examine narrative texts, but will define the concept of "moment" as follows: *A complete traverse is considered as being constituted by various moments. The length of each moment is adjustable based on the purpose of the enquiry.*[6] *The examination of each momental piece of the traverse still considers the collaborative efforts involved in the relationship among the interpreter, the medium and the narrative content*. With this definition, we can further examine a narrative text by comparing its mechanical textual behaviours in the same and different moment(s) of the traverse.

Apart from the conceptual issue found in both theories, the two theories also contain some concepts that are unnecessarily complicated and can thus be simplified to be reader friendly. For example, it seems that the criterion used to differentiate a trivial and nontrivial effort is whether a "selective movement" is involved in the textual traverse, or, in other words, whether the operator/interpreter is required to pick a route (or routes) out of many offered by the text's mechanism to complete her/his operation. In this case, it seems that "extranoematic" can just be replaced by "physical", and "nontrivial effort" by "selective physical movement/effort", especially considering that the term "trivial" has a condemnatory connotation while the quality of a text should not be solely judged by the text's ability to offer intricate traversal routes to its interpreter.

Reconstruction of the storytelling mechanism typology

This study by no means devalues the contribution of cybertext theory and the storytelling mechanism theory to scholarship. Both theories offer a neutral and inclusive perspective to study all types of texts. Such a perspective is significant in the studies of digital texts such as narrative apps. Therefore, this study chose to take the same theoretical scope as manifested in the two theories. To improve the storytelling mechanism theory, I followed its methodology, adopted the concepts of scriptons and textons in both cybertext theory and the storytelling mechanism theory. Meanwhile, I also adopted the ideas of some traversal functions identified by cybertext theory. Under this context, I reconstructed the storytelling mechanism by further developing its typology criteria from 11 to 35 that apply to both stable and unstable media. The 35 logical questions used to enquire about any narrative text in terms of its mechanical textual behaviours are as follows:

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[6] For example, when the interpreter opens a book to read, the complete reading can be divided into
   the subsequent moments of individual page-readings.

1. Is the medium[7] stable?
2. Are all the signs (e.g. visual, aural or tactile, dynamic or still) that are embedded in the text presented to *the ideal interpreter*[8] via the medium *during* the instant moment[9] of the ideal interpreter's traverse?[10]
3. If the answer to question 2 is "yes", are all the signs embedded in the text presented to *the ideal interpreter* via the medium with the *same arrangement*[11] during the *same moment*[12] of *different traverses*?
4. If the answer to question 3 is "no", is the variation of the arrangements of the signs limited?

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[7] Here, "medium" is used in the same way as in the original typology (see Zheng 2016: 63).

[8] "The ideal interpreter" refers to the interpreter who strictly follows the linear output of the text and makes her/his decisions of how to traverse the text accordingly.

[9] "Instant moment" enquires about a single moment of the traverse, or a momental piece of the traverse experience, where a certain number of textons is presented to the interpreter as scriptons in the medium. Thus, question 2 enquires about whether all the textons are presented to the interpreter as scriptons in a single momental piece of the traverse.

[10] Question 2 is a reconstruction of the traversal function of *access* in cybertext theory. However, it is different from the concept of *access* as it solves the problem caused by the ambiguous meaning of "readily available".

[11] "Same arrangement" refers to the situation where both the content and the position of the scriptons and their adjacent scriptons are the same.

[12] "Same moment" is not used to enquire about the time, but about the momental piece of the traverse where a certain number of scriptons are presented to the interpreter. If we assign a number (such as 1, 2, 3…) to each momental piece of the traverse, "same moment" enquires about the condition of the momental piece of the traverse under the same number, examining the behaviour of the scriptons (both in terms of their content and their positions to each other) presented in this very piece. Thus, question 3 investigates whether all the textons are presented to the interpreter as scriptons in the same position to each other in the medium in this single momental piece of the traverse. This question does not enquire about the content of the scriptons. This is because the premise of this question as well as of questions 5 and 7 is that all the textons are presented to the interpreter as scriptons in the instant moment of the traverse, and, therefore, the content of the scriptons is the same in these cases. However, this does not suggest that the position of the scriptons is necessarily the same. Textons are not equal to scriptons. Textons exist without any order. Scriptons, however, have both temporal and spatial orders as they are related to textual presentation. In other words, how scriptons appear in the medium in terms of the sequence of their appearance and their coordinates (or position) affects textual presentation. A scripton can be understood as containing the content of one texton or a certain number of textons, and this number of content can be combined in various orders. For example, imagine there is a piece of software whose database consists of four pictures, i.e. the textons are four pictures. When the software runs, it does not require physical engagement on the part of the interpreter to complete a traverse. During this traverse, the software shows all the pictures at once. Under this circumstance, imagine a situation where the position of these pictures on the screen varies from time to time in a complete traverse (see **Fig. 2**). Imagine another situation where the position of all the pictures is fixed in a complete traverse, but changes in another. In both situations, all the textons are shown to the audience in an instant moment, but the scripton (as the combination of textons) is not the same in the instant moment of each individual presentation. In other words, even if all textons are presented as scriptons to the interpreter, each momental piece of a complete traverse is not necessarily linked with fixed scriptons in the sense of both their content and their positions. It is important to point out that it is not necessary to divide a complete traverse into an equal length of constituent momental pieces for analysis *and* the lengths of different complete traverses of the same text are not necessarily the same. For example, the narrative app *The Ogress* (see **Fig. 1**) can provide three different complete traverses to an ideal interpreter. As the three traverses contain different narrative content from one another, the time for an ideal interpreter to finish a complete traverse may vary.

5. If the answer to question 2 is "yes", are all the signs embedded in the text presented to *the ideal interpreter* via the medium with the *same arrangement* during *different moments*[13] of the *same traverse*?

6. If the answer to question 5 is "no", is the variation of the arrangements of the signs limited?

7. If the answer to question 2 is "yes", are all the signs embedded in the text presented to *the ideal interpreter* via the medium with the *same arrangement* during *different moments* of *different traverses*?[14]

8. If the answer to question 7 is "no", is the variation of the arrangements of the signs limited?

9. Do the signs presented[15] require physical involvement(s) on the part of the ideal interpreter to traverse?[16]

10. If the answer to question 9 is "yes", do(es) the involvement(s) require selective movement(s)?

11. If the answer to question 9 is "yes", do(es) the physical involvement(s) change the arrangement of the signs?

12. If the answer to question 9 is "yes", is/are the physical involvement(s) supposed to be conducted in a certain sequence?

13. If the answer to question 12 is "yes", is the sequence permitted to vary in different traverses?

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[13] This question enquires about the stability of signs in a complete traverse of the ideal interpreter, that is, in this single complete traverse, whether each and every momental piece of the traverse is linked to exactly the same scriptons. In other words, whether the scriptons remain the same both in content and in position to each other all through the traverse. For example, imagine a situation where there is a word written on a piece of paper, and all that an interpreter needs to read is whatever is presented on this piece of paper. In this case, everything is presented to the interpreter as fixed scriptons, meaning that the content and the position of all scriptons on this piece of paper do not change. Assume that the ideal interpreter is required to examine this word for one minute. No matter how we divide this one minute into different momental pieces, in every piece, the interpreter is presented with exactly the same scripton in terms of its content and its position. In this situation, all the signs are presented to the interpreter with the same arrangement during different moments of the same traverse. Note that in a text, when scriptons remain the same for an ideal interpreter in a complete traverse, this does not guarantee, or we should not assume, that the scriptons will not change for the ideal interpreter during her/his other complete traverses. Therefore, there is a follow-up enquiry about this possibility in question 7.

[14] This question enquires about the stability of signs in different traversal experiences of the ideal interpreter, that is, comparing different traverses of the ideal interpreter, whether the scriptons remain the same in all momental pieces of all the traverses even when the ideal interpreter traverses the text at a different time. The example given in footnote 13, a word written on a piece of paper, suits the description in this situation, that is, all signs are presented to the ideal interpreter during different moments of different traverses.

[15] "Presented" refers to the signs that do not need to be revealed by themselves or by the interpreter.

[16] This question is a parallel question to question 2, not a sub-question to it. It enquires about the condition of engagement between the presented signs and the interpreter. For example, in some narrative apps, there are no hidden signs in a scene, but the presented signs can be moved around by the interpreter. In this case, the presented signs require/invite physical involvement(s) on the part of the interpreter.

14. If the answer to question 13 is "yes", is the variation of the sequence limited?

15. If the answer to question 12 is "no", is the variation of the random physical involvement(s) limited?

16. If the answer to question 2 is "no", do the unpresented signs need to be revealed by the physical operation of the interpreter on the medium?

17. If the answer to question 16 is "yes", does the physical operation involve *selective movement(s)* on the part of *the ideal interpreter*?

18. If the answer to question 16 is "yes", during one *complete traverse*[17] of the text, is it possible to reveal all the hidden signs in the medium by the physical operation of *the ideal interpreter*?

19. If the answer to question 16 is "yes", are the hidden signs revealed with the *same arrangement* in the medium during the *same moment* of *different traverses* by the physical operation of *the ideal interpreter*?

20. If the answer to question 19 is "no", is the variation of the arrangements of the signs limited?

21. If the answer to question 16 is "yes", are the hidden signs revealed with the *same arrangement* in the medium during *different moments* of the *same traverse* by the physical operation of *the ideal interpreter*?

22. If the answer to question 21 is "no", is the variation of the arrangements of the signs limited?

23. If the answer to question 16 is "yes", are the hidden signs revealed with the *same sequence*[18] in the medium at *the same moment* of *different traverses* by the physical operation of *the ideal interpreter*?

24. If the answer to question 23 is "no", is the variation of the sequences limited?

25. If the answer to question 16 is "yes", are the hidden signs revealed with the *same sequence* in the medium at *different moments* of *the same traverse* by the physical operation of *the ideal interpreter*?

26. If the answer to question 25 is "no", is the variation of the sequences limited?

27. If the answer to question 16 is "no", do all the unpresented signs reveal themselves?

28. If the answer to question 16 is "no", do all the unpresented signs reveal themselves with *the same arrangement* during *the same moment* of *different traverses*?

29. If the answer to question 28 is "no", is the variation of the arrangements of the signs limited?

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[17] "Complete traverse" is used in the same sense as the one in the original typology (see Zheng 2016: 63).

[18] "Same sequence" refers to the order of the appearance of each scripton. This question enquires about the behaviour of the scriptons generated by the interpreter during the same momental piece of the traverse. For example, each scene of a narrative app can be considered as a momental piece for the interpreter to traverse. When the ideal interpreter encounters the same scene of the app on various occasions, and when s/he has to physically generate scriptons out of this scene, is there a fixed order to reveal all the hidden textons? This is what question 23 asks about.

30. If the answer to question 16 is "no", do all the unpresented signs reveal themselves with *the same arrangement* during *different moments* of *the same traverse*?

31. If the answer to question 31 is "no", is the variation of the arrangements of the signs limited?

32. If the answer to question 16 is "no", do all the unpresented signs reveal themselves with *the same sequence* during *the same moment* of *different traverses* of the *ideal interpreter*?

33. If the answer to questions 32 is "no", is the variation of the sequences limited?

34. If the answer to question 16 is "no", do all the unpresented signs reveal themselves with *the same sequence* during *different moments* of *the same traverse* of the *ideal interpreter*?

35. If the answer to questions 34 is "no", is the variation of the sequences limited?
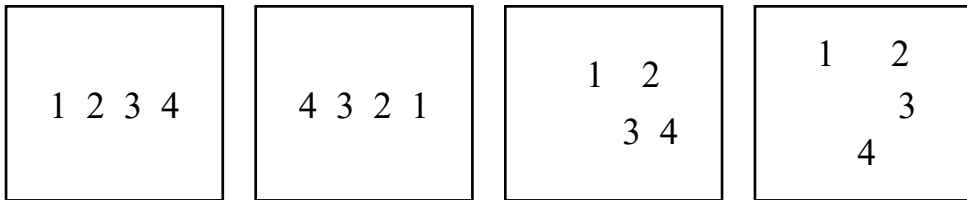

Fig. 2. A visual example of the case discussed in footnote 12. Each square represents the same screen, and the four digits in each square represent four pictures shown on the screen respectively. Each position of the digits in a square represents a possibility of how the four pictures may appear to the interpreter on the screen. The four possibilities demonstrated here are just four of many.

The rationale for the new typology

The sequential relationship of all the questions is visualised in **Fig. 3**, while **Fig. 4** is a map constructed out of the possible answers to all the 35 questions. Through the visualisations of the typology, one can see a series of in-depth enquiries about the influence of each individual element in the storytelling mechanism, as well as about the collaborative influence of all the elements in producing a narrative. The enquiries start with the medium, as it is the key element that intermediates between and influences the other two elements, i.e. without the medium, the narrative content as abstract concepts cannot be materialised to present to the interpreter, and consequently the interpreter cannot process, influence or interpret the narrative content. After enquiring about the stability of the medium, the following questions (Q2-Q35) examine the status of the signs (i.e. the materialised narrative content) presented in the medium in relation to the effort (mainly physical) offered by or required on the part of the interpreter during the traverse.
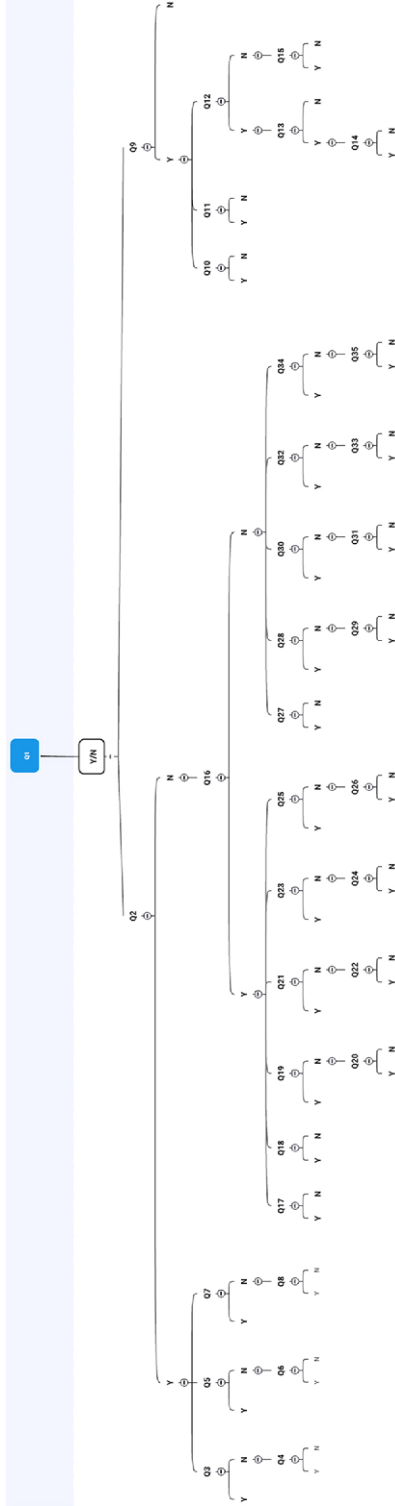
Fig. 3. A visualisation of the sequential relation among the 35 questions. "Q" is short for "question", "Y" is for "yes" and "N", "no". "Y/N" under "Q1" means both answers of "yes" and "no" to question 1 apply to the situations visualised below them.

The same as the original typology constructed by Zheng (2016), the new typology, here referred to as typology 2.0, is also theoretical, which means that there might be text types which do not have empirical equivalences. The chain of 35 questions is strictly linked in a logical way so it avoids repetition of text types. These 35 questions are not (meant to be) exhaustive, as there are many sub-questions that can be added to the chain to make for a more meticulous description of a narrative text. For example, for questions that ask about the arrangement of signs presented to the interpreter, if the answer is "no", i.e. the signs are not presented with the same arrangements, we can ask sub-questions to enquire about in what ways the arrangements of signs are different, such as [1] whether it is a positional difference where the content of the scriptons and their adjacent scriptons are the same but their position(s) change(s) either individually or as a whole; [2] whether it is a semantic difference where the content of the scriptons changes but the positions are the same; or [3] whether both the content and the position(s) change. Question 16 asks whether the unpresented signs need to be revealed by the physical operation of the ideal interpreter. If the answer is "no", apart from what has been asked in questions 27-35, we can also enquire about the ways in which the unpresented signs reveal themselves. For questions 10 and 17 that ask whether the physical involvement(s) involve(s) selective movement(s) from the ideal interpreter, after this question, we can continue to investigate what kind of selective movement(s) is/are needed from the ideal interpreter.

By adding sub-questions, we can use typology 2.0 to analyse specific media behaviours or textual behaviours in detail. However, it is not the purpose of the current research to map out all the possibilities of textual communications, nor is it possible to do so. Just like cybertext theory and the storytelling mechanism theory, this typology, as part of the developed storytelling mechanism theory or storytelling mechanism 2.0, aims at providing a perspective to study how texts work without any prejudice against any particular medium/media.

Conclusions and indications

This paper contains two parts: one part is to evaluate the storytelling mechanism theory, and the other to improve the theory. By comparing the theory with cybertext theory on which it is built, this paper has clarified the position of the storytelling mechanism theory in relation to its theoretical origin. It has posited that the methodology used in the storytelling mechanism theory is more logical than that of cybertext theory in enquiring about the mechanical production of a narrative, as the former balances the investigation by looking at both individual element's behaviours and their mutual influence on each other, which the latter overlooks. As the three elements in the textual machine do not work in isolation, but in collaboration, the storytelling mechanism theory thus reflects more of such collaborative efforts than cybertext theory does.

However, this paper has also pointed out that there are some conceptual problems in cybertext theory that have not been solved successfully by the storytelling mechanism
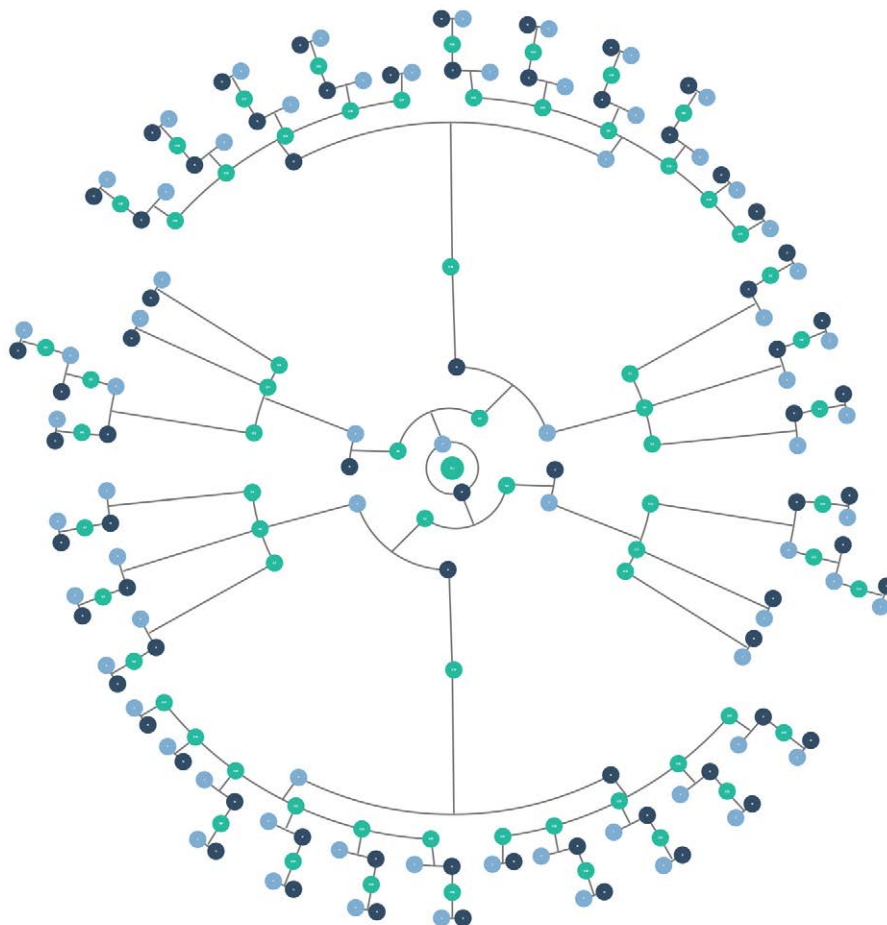
Fig. 4. This is another visualisation of the typology of narrative texts, namely, the Storytelling Mechanism Route Map. The map is created based on the answers to the 35 questions. It specifies every possible route through which a theoretical narrative can be generated via collaborative efforts from the narrative content, the medium and the interpreter. Each green dot represents a question. The light navy blue dot represents the answer "yes", and the dark navy blue dot represents "no". The travel route starts with question 1, the big green dot in the centre of the map. The possible routes of the generation (or production) of a theoretical narrative thus start from the centre, and, depending on an answer of "yes" or "no", spread to the "Y"(s) and "N"(s) at the end(s) of the line(s) leading to the outermost circle.

theory when the latter adopts the concepts of the former. This paper has not only solved the problems, but has also developed the storytelling mechanism theory for it to contain 35 sequential questions that enquire in much more detail about each (mechanical) aspect of the narrative production with both stable and unstable media. It has also advanced the storytelling mechanism by constructing two visual aids (**Fig. 3** and **Fig. 4**) for a

better understanding of the new typology of narrative texts. The visualisation of the sequential/logical relations among the questions (**Fig. 3**) helps us to make sense of the rationale for the 35 criteria. The storytelling mechanism route map (**Fig. 4**) is useful in visualising two aspects of a narrative production: one is the level of the complexity of the mechanism of a narrative text, which can be perceived from the actual number of dots occupied by a particular text – the more dots occupied, the more complicated the textual machine is; the other is the process or the sequential steps of the narrative being produced, which starts from the biggest middle dot and travels through dots and lines to the outer circles. This suggests that the route map may also be useful to be adapted to analyse the interpreter's experience as each different route map of a narrative indicates difference choices made by the interpreter during her/his traverse.

It needs to be pointed out that the route map cannot reflect the quality of a narrative, as the quality is merely relevant to the complexity of a textual mechanism. However, this is not to suggest that the two things should/cannot be related. On the contrary, the mechanical strategies for the production of a narrative (particularly digital ones) should/can be used as devices to aid the storytelling and to make a better narrative, and the creation of a narrative should/can also take advantage of possible mechanical strategies. This indicates that the interpretative layer of the storytelling mechanism requires equal attention, and such a layer should be enquired about along with the mechanical layer, as the two layers mutually influence each other. Thus, future research might be interested in studying how the two layers influence each other and how to build links between the quality of a narrative and the complexity of its mechanism so as to understand better the narrative and the aesthetic aspects of a textual machine.

It is not the intention of this paper to explore the practical application of the storytelling mechanism. However, as Zheng (2016) suggests, the storytelling mechanism theory has strong potential to be applied to the creation and analysis of arts and literature. This potential may be worthy of further studies.

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Pripovjedni mehanizmi 2.0: još jedan pogled na digitalnu književnost

Ovaj rad donosi raspravu o načinima mehaničkoga djelovanja pripovjednih tekstova, utemeljenu na teoriji pripovjednih mehanizama Yan Zheng (2016) i teoriji kiberteksta koju je predstavio Espen Aarseth (1997). Rad potvrđuje ranije Zhengine zaključke o tome da, kad je riječ o njihovu mehaničkome tekstualnome ponašanju, bitnije razlike između digitalne književnosti i književnosti predstavljene pomoću drugih platformi ne postoje. Međutim, rad također ukazuje na ograničenja ranije Zhengine teorije. U svrhu unaprjeđenja te ranije teorije u radu se uvodi razlika između teorije pripovjednih mehanizama i njezina teorijskoga polazišta – teorije kiberteksta, izbjegavaju se problemi uočeni u objema teorijama te se razvija Zhengina tipologija pripovjednoga teksta proširivanjem s pomoću 35 logičnih pitanja koja mogu ponuditi precizniju stajališta za promišljanja o pripovjednome tekstu. Nadalje, rad konstruira kartu koju je moguće rabiti kao vizualni prikaz načina na koji se pripovjedni tekst suradničkim naporima gradi od triju elemenata pripovjednoga mehanizma.

Ključne riječi: pripovjedne aplikacije, pripovjedni mehanizam, teorija kiberteksta, tipologija, mediji, suradnički napori

Erzählmechanismen 2.0: Ein abermaliger Blick auf die Digitalliteratur

Im Beitrag werden anhand der Theorie über die Erzählmechanismen von Yan Zheng (2016) und der von Espen Aarseth (1997) vorgestellten Cybertexttheorie die mechanischen Wirkungsweisen von Erzähltexten besprochen. Es werden Zhengs frühere Schlussfolgerungen darüber bestätigt, dass sich die digitale Literatur von der in Form anderer Plattformen vermittelten Literatur in Bezug auf deren mechanische textuelle Verhaltensweisen nicht

wesentlich unterscheidet. Dennoch wird im Beitrag auf die Beschränkungen von Zhengs früherer Theorie hingewiesen. Um diese Theorie weiterzuentwickeln, wird im Beitrag zwischen der Theorie der Erzählmechanismen und deren theoretischem Ausgangspunkt – der Cybertexttheorie – unterschieden, die in beiden Theorien enthaltenen Mängel behoben und Zhengs Erzähltexttypologie mit Hilfe von 35 logischen Fragen erweitert, die zur exakteren Erforschung von Erzähltexten beitragen können. Es wird auch eine Karte als visuelle Darstellung der Art und Weise beigefügt, worauf man einen Erzähltext als Gemeinschaftsprojekt anhand dreier Elemente des Erzählmechanismus aufbauen kann.

Schlüsselwörter: Erzählapps, Erzählmechanismus, Cybertexttheorie, Typologie, Medien, Gemeinschaftsprojekt