

## Beyond free will: Understanding approaches to agency and their suitability for *Bandersnatch*-like titles

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### ABSTRACT

When *Bandersnatch* (2018) was released on Netflix, interactive storytelling became accessible to a mainstream audience on a new scale. While this interactive film lets audiences make binary choices, the influence they have over the plot is limited, and at times the correlation between a choice and the resulting story is difficult to recognize. Although it can be argued that this constitutes a thematic design choice for this particular title, we think there is general room for improvement for this type of highly restrictive, branching structure film, in order to make the format applicable to a wider range of themes and stories. In this paper, *Bandersnatch* is examined as a representative of its format in order to develop and identify approaches to increasing agency. We use Hartmut Koenitz's SPP model to understand the title and its format, and the hermeneutic strip extension to assess the perceived agency. Then, we introduce and examine potential approaches to increased agency from other interactive narratives to understand their adaptability and impact. Our discussion concludes that the most promising design idea for increased agency in *Bandersnatch*-like titles is invisible agency; an approach in which a player model is generated based on identifiable traits in the audience behaviour and used to select matching plotlines. This approach would allow audiences to see the results of their choices immediately, but also allow the impact of the choices to accumulate as the plot progresses, thereby increasing the overall sense of agency.

### 1. Introduction

After the launch of *Black Mirror's Bandersnatch* on the online streaming platform Netflix in December 2018, the format of interactive films has become accessible to a mainstream audience. After the title's success, Netflix announced its plans to produce more interactive titles aimed at a mature audience [1], such as *Unbreakable Kimmy Schmidt: Kimmy vs. the Reverend* (2020) [2]. This format is also being explored by smaller production companies, like CtrlMovie who are dedicated to creating interactive films with experimental and sophisticated UI, like *Late Shift* (2016) [3].

While *Bandersnatch* has brought interactive films to a wide audience, its format is subject to severe limitation in terms of audience agency. Therefore, a discussion on how the format could potentially be improved is essential, timely and constructive for the production of interactive works in the future.

This paper takes its starting point in our previous work which

appeared in the ICIDS 2020 proceedings [4] and aims to identify design ideas that can increase audience agency in *Bandersnatch*-like titles without jeopardizing the experience in terms of its narrative momentum, replayability, and thematic elements. Due to its prominence and typicality, *Bandersnatch* is chosen as a representative of its format of highly restrictive interactive film in the case study of this paper. Our methodology is to examine *Bandersnatch* with the SPP model [5] and its extension [5,6] in order to understand the title's narrative format and structure. This will be followed by an analysis of the title's user agency or (as audiences might perceive it) the "free will" it gives to its players in their choices. However, these two concepts will not be used synonymously in this paper, because by using them interchangeably in the realm of interactive narrative, one ignores the importance of necessary constraints imposed on the audience to drive the story forward [7].

Therefore, it must be considered that increased agency through increased interaction could potentially lead to a decrease in the narrative momentum. Once the audience becomes in charge of the story, the

Abbreviations: IDN, Interactive Digital Narrative; SPP, System, Process, Product; UI, User Interface; ICIDS, International Conference on Interactive Digital Storytelling; CYOA, Choose Your Own Adventure.

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risk increases of them getting stuck at certain plot points, thereby preventing the story from unfolding or developing in any meaningful way. These potential risks have to be taken into consideration when suggesting ways to increase agency in interactive storytelling.

After the analysis of the title, different approaches to agency will be outlined and assessed regarding their suitability for titles with a similar format to *Bandersnatch*, and similar target audience and screening settings. Finally, the most suitable approach will be elaborated, and its conceptual implementation will be explored further.

## 2. Background

### 2.1. Top-down and bottom-up systems

Marie-Laure Ryan differentiates between two fundamental approaches in interactive narrative: The bottom-up, emergent systems that create stories on the fly, and the top-down systems that rely on pre-scripted content. Examples of bottom-up systems are simulation games like *The Sims*, where, as Ryan explains,

the player's selection counts as the performance in the fictional world of the action described by words on the menu [...] The succession of choices writes the life story of the Sims family [8, p. 50].

Here, the system has to react to the player's behaviour in real time and offer meaningful consequences to them. A more sophisticated, and purely hypothetical, example of an emergent system would be the fictional *Holodeck* machine from the television franchise *Star Trek*, which was proposed by Janet Murray in 1997 and since then has served as a guiding metaphor for researchers in interactive storytelling. The *Holodeck* is a stage that allows users to engage with virtual environments and where every single input affects the environment and thereby the narrative. Since it would not be possible to store all the storylines created by the user's input in advance, the only way for such a complex system to work would be to compute the effects in real time [9].

In contrast, top-down systems like *Bandersnatch* require all the scenes that can be unlocked by the user to have been produced in advance. This means that while the audience is given some agency over the narration, they cannot truly create different endings but only unlock what is already there. The resulting difference between these two approaches is that while the emergent system can be run multiple times, creating multiple outcomes, the top-down approach does not renew itself, even if it offers some different narratives [8].

A drawback pointed out by Ryan concerning the bottom-up approach, however, is the potential lack of closure, as she argues that without the authorial control from the top-down approach, it is impossible to create the Aristotelian curve of rise and fall of tension, or even just a resolution and end of events [8]. An interactive drama to counter Ryan's concerns about the bottom-up approach is *Façade* (2005) by Michael Mateas and Andrew Stern. It was considered a breakthrough piece, as it interprets the player's input in real-time to construct a captivating dramatic arc while also allowing a high degree of interaction with the AI-driven characters [10].

It is important to note that the top-down and bottom-up approaches are not mutually exclusive and should be treated as two ends of a spectrum, which allows elements from both ends to be combined in a single experience. Sometimes in *The Sims*, the game takes control and adds pre-scripted scenarios to the simulation, e.g., alien abductions. While the game cannot control the state that the user has put the virtual world in, such plot twists add narrative momentum to the simulation. We consider this an attempt to drive the game and the story it tells forward, even if simulation games like *The Sims* do not necessarily require an overarching story.

However, this design opens up the opportunity to have emergent systems exist within top-down systems, by allowing user behaviour to generate events that would be consistent with top-down arcs. Obviously, this would require limitations in the bottom-up interaction responses of

the system in order to be able to align the generated story world with a pre-scripted top-down arc. Player modelling, i.e., detecting and understanding the player's "cognitive, affective, and behavioural patterns" [11, p. 45] during the interaction in playable scenes can be used to determine the respective pre-scripted arc. A practical example would be only adding the randomly occurring alien abduction sequence in *The Sims*, when the generated state of the universe and/or the player modelling allow for it in a narratively meaningful way.

### 2.2. Interactivity and agency

One essential element of interactive stories is audience agency. Murray describes agency as "the satisfying power to take meaningful action and see the results of our decisions and choices." [9, p. 159] If players of a tabletop board game are given increased means of interactions, like throwing dice and spinning dials, they might get the sense of having an influence on the experience. However, their actions are neither chosen by them, nor do their effects mirror the player's intentions. This is where Murray draws the line between *activity* and *agency*. As an example, she explains that a game of chess has a high degree of agency even though it only offers few actions. That is because all actions are "highly autonomous, selected from a large range of possible choices, and wholly determine the course of the game" [9, p. 161]. Murray defines agency in her glossary as follows:

When the behavior of the computer is coherent and the results of participation are clear and well motivated, the interactor experiences the pleasure of agency, of making something happen in a dynamically responsive world. [12]

In order to allow for agency in a narrative, the narrative requires not only multiple paths, but also oftentimes multiple endings. Depending on how complex the story is meant to be, these formats often may not resort to the win/lose simplicity of classic video games, but rather have multiple ending scenarios that can be understood as the consequence of the player's input. These outcomes can either be the direct effects of certain actions or can be reached through a chain of uncontrolled scenarios kicked off by the player's input (similar to the butterfly effect, a metaphorical example of how a tornado can be influenced by something as minor as the flapping of a butterfly's wings months earlier).

There are many different structures for branching narratives, each of which branches out differently and in different degrees, thereby allowing different degrees of agency. Sam Kabo Ashwell has created an extensive list of possible structures, some of which are the following:

The *Time Cave* structure (see Fig. 1) is the most obvious kind of branching structure, where each decision point offers a new forked pathway, thereby having the plot branch out exponentially. This structure strongly encourages replay, as different walkthroughs tend to be substantially different in content and overall experience [13].

A less production-heavy alternative is the *Gauntlet* structure (see Fig. 2). This structure is defined by its relatively linear thread that has several branches which lead either to dead ends, backtracking, or a re-joining with the central thread. Overall, this structure tells one main story, which can either be enhanced with optional content or cease prematurely if a dead end is chosen.

The *Branch and Bottleneck* structure (see Fig. 3) branches out at times and comes back together for key plot points. Agency is facilitated in this structure by the implementation of state-tracking, meaning that even

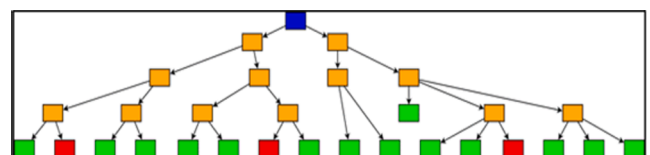


Fig. 1. Time Cave Structure [13].

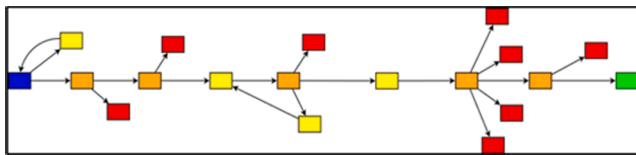


Fig. 2. Gauntlet Structure [13].

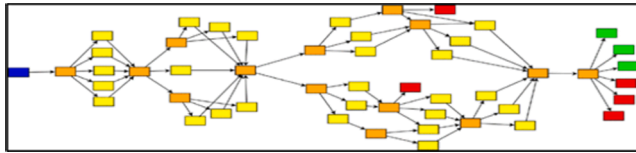


Fig. 3. Branch and Bottleneck Structure [13].

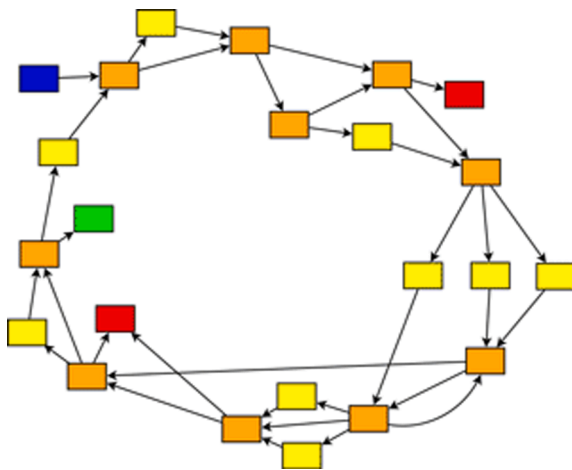


Fig. 4. Loop and Grow Structure [13].

though the player ends up at a certain plot point, regardless of the previous choices, these previous choices and the underlying behavioural pattern of the player are stored in the system and later influence the way the story moves forward (i.e., only certain endings become a possibility once a certain path was taken). Here, oftentimes players do not notice the agency – in this case the agency is somewhat invisible.

The *Loop and Grow* structure (see Fig. 4) has one central thread that keeps looping to the same point. Due to state-tracking each loop might be slightly different than the previous with new options appearing and others disappearing. This type of structure usually requires a thematic justification for plotlines to be revisited over and over again, e.g., time-travel.

### 3. Methodology

For this paper, Hartmut Koenitz’s analytical framework, the SPP model and its extension (see Figs. 5–7), will be used to analyse *Bandersnatch*. This analysis is essential to understand the IDN in question in order to subsequently identify promising design ideas for increased agency.

In Fig. 5, the term *system* is used to describe the interactive program itself, including both the software and hardware required for the interactive experience. The *process* is the user’s interaction with the system, which ultimately results in a *product*, a singular storyline based on the user’s input, which would be different if the user’s input were to change. The product is therefore an instantiated narrative [5].

As part of the model, Koenitz introduces three additional terms: *Protostory*, *narrative design*, and *narrative vectors*. Protostory is the space

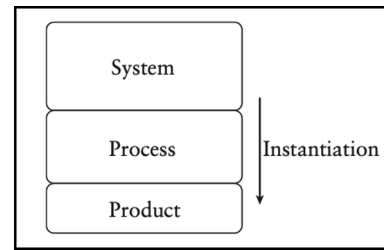


Fig. 5. Koenitz’s SPP model [5].

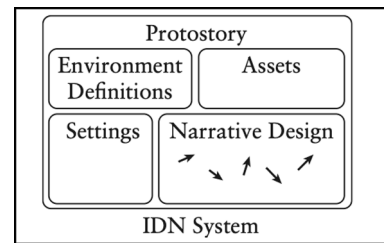


Fig. 6. The SPP model’s associated terminology for the analysis of IDN [5].



Fig. 7. The additional extension by the double-hermeneutic circle offers a methodological toolkit for the analysis of experienced agency [6].

of potential narratives, “containing the necessary ingredients for any given walkthrough.” It stands for both the code and the interactive interface of the system, and thereby captures the

artistic intent that enables a participatory process of instantiation resulting in the realisation of potential narratives [...] The term narrative design describes the structure within a protostory that describes a flexible presentation of a narrative [5,p. 99].

In other words, the narrative design deals with the sequencing of elements and their connection in the narrations. A substructure of narrative design are the narrative vectors, which provide specific directions for the story. They have to be understood as substructures that work in connection with the preceding and following parts of any narrative. Their purpose, as Koenitz states, is “to convey important aspects to the interactor, to prevent an interactor from getting lost and to aid authors in retaining a level of control” [5,p. 100]. A narrative vector could, for instance, be a sudden event in the plot that shapes the development of the story and can be compared to plot points in linear narratives.

One thing that is not covered by Koenitz’s SPP model is the idea of agency. However, in a paper by Christian Roth, Tom van Nuenen and Koenitz himself, an extension to the model was introduced, namely the hermeneutic strip or double-hermeneutic circle [6]. This strip aims to illustrate the player’s narrative meaning-making process. It captures both the interpretation of the system overall (i.e., the players’ reflection on what the system may allow and which freedoms or agency they have)

and the players' interpretations of already instantiated narratives.

It is important to understand that this extension to the model bears in mind that a player's behaviour (which is assessed through their interaction with a system) is shaped by previous experiences made in the interactive narrative. In short, past and present events influence a player's future behaviour. As this extension will help evaluate agency from a player's perspective at predefined points of the story, these key points must be identified first [6].

By examining the protostory, all assets of the title, as well as all components that make up any storyline and the interface will be laid out. Going into more detail, the narrative design will define the segmentation of different scenes and the choices that connect them. By thoroughly analysing the narrative vectors, the level of control of the producers will be understood, as these plot points are the orientation points that prevent the audience/players from getting lost, resulting in a loss of narrative momentum. The double-hermeneutic circle model will help evaluate the agency from a user's perspective at predefined key scenes. It is important to add that the authors of this extension used it in the context of a quantitative analysis of players' reactions based on Let's Play videos found online, where they examined reactions at a predefined key scene. In this paper, we base our analysis on the range of *possible* reactions rather than a study of *actual* reactions.

#### 4. Bandersnatch

*Black Mirror's Bandersnatch* was marketed as the first interactive film aimed at a mature audience on the streaming platform Netflix. Similar to previous episodes of the *Black Mirror* franchise, an introspective view on technology is reflected in the plot of the film but also – for the first time – in its interactive structure. The critically scrutinized technology in *Bandersnatch* is not only the one used by characters in the plot, but also the one used by the audience itself, as the theme of the film deals with the question of the existence of free will, agency and control. The controllable character, Stefan, an aspiring game developer in the 1980s is attempting to create a video game called “Bandersnatch,” which has a branching narrative structure, like the CYOA book it is based on. As the film progresses, the audience is forced to make choices that are not in Stefan's best interest due to the lack of more favourable options. In response, Stefan finally breaks the fourth wall and confronts the audience by asking which outside force is controlling him. According to Roth and Koenitz, in *Bandersnatch*, there is a parallelism for control, as agency is “explored in parallel – in the diegetic world and the interactive narrative experience” [14,p. 249].

##### 4.1. *Bandersnatch: system, process and product*

In *Bandersnatch*, the audience can take control of the direction of the plot. At predefined choice points they are prompted to choose between two binary textual choices within ten seconds. If no choice is made, the system defaults to one of them automatically, allowing for what Roth and Koenitz refer to as “passive consumption” [14,p. 249]. The overall branching structure of the title is close to a Gauntlet, as introduced in Section 2.2, since there is a main thread, which is close to linear, with some branches emerging from it that lead to dead ends, as well as backtracking and re-joining branches.

Using Koenitz's SPP model for the analysis, the system in this title consists of any device that the film can run on, for the hardware part. Netflix has made some restrictions concerning which devices are compatible with the film and created an apology clip which is screened in case the used device was incompatible with the functionalities of the title. The software of *Bandersnatch* includes the interface, which is shortly introduced and explained to the audience at the beginning of the interactive experience. The UI at choice points consists of two textual options and a timer in the form of a horizontal line which decreases in length and disappears after ten seconds. Since the overall length of the film is subject to the audience's input, there is no overall info of the

film's duration or a progress bar. Other parts of the system are all virtual assets, which include all scenes, choice points and their respective options, as well as the program that manages the audiences' inputs and outputs the corresponding narratives. Another important feature is that the system maintains state, as previous choices can be influential or at least referenced as the film progresses.

The process in this title is determined by the audience's input as well as the choice options that the system provides. Due to the Gauntlet structure of the film, which contains multiple dead ends, the audience is often prompted to change their chosen narrative path in something equivalent to a respawn with Stefan saying, “I should try again.” Even when a more conclusive ending has been reached, the system asks the users if they want to explore yet another path. This option of going back and trying out variations of the interactive narrative has been defined by Murray as the “kaleidoscopic form,” which she describes as

the potential of interactive digital narratives to present us with multiform scenarios in which the same events can be understood in multiple contexts and the same starting points can be imagined as giving rise to multiple possible outcomes. [15,p. 3]

Kaleidoscopic design goes hand in hand with the long-standing notion of IDNs as replay stories [16]. Consequently, the longer one chooses to interact with the film or the more times one chooses to replay it, the more storylines can be unlocked and the more likely one is to have similar viewing experiences as other audiences. However, this in turn means that the instantiated product is not as unique as Koenitz has described it, by stating that “very different narrative products can originate from the same system” [5,p. 98]. The structure of *Bandersnatch* as well as the encouragement to explore as many narrative paths as possible, does not allow for a high level of uniqueness or variety regarding the instantiated product. The only major difference between independent viewings would be the sequence in which the different audiences have seen the different plot lines and endings.

##### 4.2. *Bandersnatch: protostory, narrative design and narrative vectors*

The content in *Bandersnatch* can be broken down to the small entity of scenes for the protostory. Another part of the protostory is the already introduced interface and the code that allows the interactive film to run according to the audience's input. Additionally, features of the default interface of Netflix are also available or adjusted to the nature of the film, such as the buttons to fast-forward and rewind ten seconds, which only allow users to fast-forward until the next decision point but not beyond it.

The narrative design of *Bandersnatch* is overall close to linear, which is typical for the film's Gauntlet structure. It makes sense to segment the design into bundles of scenes which are co-dependent. This means that flexibility exists between different bundles of scenes rather than within them.

We can consider the narrative vectors to be the scenes that are revisited upon respawning (i.e., letting Stefan “try again”) as well as the respawn function itself, since they convey the message that the previously chosen path led to a dead end. Therefore, the narrative vectors act as orientation points to guide the audience through the narrative. A minimal impact on the narrative momentum is ensured through dramatic compression [17] upon respawning. This means that scenes that have to be replayed when the audience decides to go back and try again, are sped up until the decisive choice point is reached once more [18]. It can be argued that the narrative vectors in *Bandersnatch* work in a way that facilitates the consumption of the majority of storylines that exist.

##### 4.3. *Bandersnatch: double-hermeneutic circle and agency*

To be able to use the double-hermeneutic circle to assess agency, we must first identify key choice points for the analysis [6]. It is important to identify at least one choice point that any user would encounter,



regardless of the narrative path they take. The logical choice falls on the first influential choice point, which is when Stefan is offered a job as a game developer. The previous two choice points were inconsequential and even presented as such, e.g., choosing which cereal Stefan has for breakfast. Therefore, the job offer, which Stefan can either accept or decline, seems like it could result in two contrasting storylines.

This idea of two distinct branches resulting from this choice can emerge from the upper hermeneutic circle's interpretation of the system. However, by analysing the bottom hermeneutic circle, one might consider how previous choices were uninfluential and therefore doubt any significant consequences to be brought about by this choice. Albeit this choice point is presented as potentially plot-altering, it might confuse the audience, given the previous choice points. In a meta-discussion, it can be suggested that a novice IDN audience might expect two major branching storylines from here onwards, whereas a seasoned audience could be more aware of potential production constraints resulting in one of the options being a false choice. In this case, the sceptical audience is correct, as accepting the job leads to an immediate dead end and lets the audience redo this decision. This looping behaviour then alters the hermeneutic circles, as the audience learns that the only real choice is to decline the job offer.

One more key choice point worth examining is when Stefan is confronted with two rather similar, destructive options, as briefly introduced in section 4. The audience is constrained to choosing whether Stefan destroys his computer or pours his tea over it, when both options clearly bear the same consequence of his work being lost. The lack of an option that could lead to an alternative consequence lets the audience realize that in this instance they have no real control over what is to happen next, even if they were to influence how it is brought about. With tied hands, they can either surrender to the limitations of the available options or watch the system default to one of the options for them. Either way, it becomes a violation of the narrative contract through the removal of agency that the audience expected to have up to this point.

However, in a cleverly constructed twist, Stefan breaks the fourth wall by refusing his orders as he realizes that he does not wish to destroy his computer and that he is being controlled by an outside force. Neither a reflection in the upper nor bottom hermeneutic circle could have raised a suspicion of this plot twist, since all previous inputs by the audience resulted in corresponding actions performed by Stefan. However, in one of the film's endings, an almost identical choice point appears, this time showing a grown-up Pearl after a time jump of roughly 30 years. As she is attempting to program Netflix's interactive film "Bandersnatch," the film that the audience is watching, she keeps encountering errors and gets frustrated. Again, the presented options are to destroy the computer or to throw tea over it. Due to the already instantiated narrative, a reflection in the bottom hermeneutic circle might result in thinking that also in this instance will the given command be ignored by the system, especially since the audience has no means of knowing that with this scene, they have reached an ending and that it would therefore be unlikely to have another plot twist. However, in this case, Pearl performs the destructive act respective to the selected option.

Reflecting on the overall agency in *Bandersnatch*, we observe that in almost all choice points two options are given. One of the exceptions is a flashback scene of Stefan's deceased mother who asks him if he wants to come with her on a journey. The only option is to say "No," nodding at the idea that the past is immutable. There are also a number of deceptive choice points that offer two very similar options, like the two previously discussed in which the audience can choose how Stefan and Pearl should destroy their computers. Furthermore, the gravity of the choice points is not held to a constant level, as they range from choosing which music to enjoy to deciding whether or not to kill Stefan's father. In the scene where Stefan attempts to crack his father's safe, each password option the audience can choose from takes Stefan to a storyline that resonates with the password. It is never revealed which password would have opened the safe correctly; instead, the audience gets to unlock different

facets of Stefan's life and the film's universe [19]. It is therefore not clear, if Murray's definition of agency being "the power to take meaningful action and see the results of our own choices" [9,p. 159] works well with *Bandersnatch*, as the audience's input prompts a corresponding output, but leaves the audience wondering about how meaningful the consequence was. This can be due to the unrelatable personality of Stefan, who the audience might not have had enough time to sympathise with before having to control his life, or perhaps due to choice options that violate the narrative contract, or perhaps even due to the unpredictability of the *Bandersnatch* universe.

This unpredictability is seen in the choices that unleash a butterfly effect that causes several events, which the audience has no control over. An example of this occurs early on in the film when Stefan chooses to accept the job offer, and the film fast-forwards several months to reveal the resulting game's poor reviews. This example is symptomatic of the overall inconsistency of the gravity of different choices, which is most likely a stylistic choice to reflect the film's theme of chaos and the lack of control over life. However, this in turn means that the consequences of the audience's input are not always meaningful or foreseeable. This conclusion is supported by the quantitative survey on *Bandersnatch* conducted by Lobke Kolhoff and Frank Nack with a sample group of 169 participants who had seen the film: Overall 69% have said they disagree, or neither agree nor disagree with the claim that consequences in *Bandersnatch* are foreseeable [20,p. 82]. Table 1.

## 5. Reflection on replayability, narrative momentum, agency, and thematic suitability

After having analysed *Bandersnatch* with Koenitz's SPP model and its extension, this section will evaluate its replayability, narrative momentum, as well as agency.

As established, *Bandersnatch* is structured around a main narrative thread. The interface allows viewers to jump back to their previous choices and alter them, and even once an official ending has been reached, the film prompts its audience to decide if they want to go back and explore an alternative storyline that had not been unlocked yet. In this way, we could say *Bandersnatch's* kaleidoscopic design trades the overall per-title replayability for per-scene replayability, as it seems to encourage the viewer to watch as many scenes as possible in one session.

In *Bandersnatch*, the narrative momentum is not influenced by the player's input, as choices have to be made within ten seconds during which the controllable character is shown to be reluctant about what to do next. If the player does not make a decision within the allotted time, the film defaults to one of the options.

When taking a deeper look at *Bandersnatch*, the interaction is facilitated by two textual prompts that lead to different actions of the protagonist and thereby change the plot. However, as previously discussed, there is a decision point at which Stefan refuses to follow through what he is being ordered to do by the audience and breaks the fourth wall by confronting the force that he thinks is controlling him – an act that according to Roth and Koenitz also breaks the viewer's identification with Stefan and encourages a reflection on agency [14]. In this twist of events, the plot develops in a direction that is independent of the user's input, and what follows are streams of unexpected events, one of which

**Table 1**

Kolhoff and Nack's questionnaire results on agency in *Bandersnatch* (SA = strongly agree; A = agree; NA = neither agree nor disagree; D = disagree; SD = strongly disagree) [20].

	SA	A	NA	D	SD
Content frequency choices	20%	47%	20%	11%	4%
In control experience	21%	33%	24%	15%	7%
Desirable consequences	5%	26%	46%	20%	4%
Foreseeable consequences	5%	14%	33%	36%	11%
No choice while preferred	14%	30%	27%	20%	9%
Unnecessary choices	17%	24%	22%	28%	8%

involves Stefan killing his father. This is a significant act that is out of the audience's control in some storylines, while in other playthroughs the player gets to choose to either kill the father or back off during the same scene. Close to one of the endings, the audience can see Stefan proudly talking about his video game to his psychologist Dr Haynes and saying that he had finally finished it by reducing the amount of agency given to the player: "Now they only have the illusion of free will, but really I decide the ending." This quote by Stefan seems to go hand in hand with the structure of the interactive film, as multiple different paths can lead the audience to the same ending and some paths seem rather forced, like the one where Stefan unexpectedly kills his father.

Moreover, the impact of the audience's inputs varies significantly in *Bandersnatch*, as some choices can be entirely ignored by the system and manoeuvred around to have the same output as the option that was not chosen, such as when Stefan decides against taking LSD, but his tea is spiked anyway. Other decision points offer two very similar options that would result in the same consequence but bring it about differently, which goes against the notion of agency and thereby further limits the perception of it. As Sercan Şengün explains, "Forcing a choice and constraining the alternatives or presenting inconsistent alternatives may thwart instead of support the feeling of freedom" [21, p. 184]. Some decision points let the player make rather trivial decisions while others can become a matter of life and death. However, the trivial decisions can bring about unforeseen consequences, either in a butterfly effect or by immersing the audience into the parallel realities that this interactive film is trying to fabricate.

This theme could arguably be the work reflecting on the chaotic nature of the universe, highlighting that much of the experience of control in life is at best precarious and subject to a highly unpredictable universe or at worst completely illusory. This thematic-structural resonance works well, as the overarching question raised throughout the narrative is whether the character is in control or not. The resonance is also reflected in the fictional CYOA book "Bandersnatch" on which Stefan bases his video game with the same title. Here the enemy, the "Pax" demon, is the thief of destiny who appears to be in control over the plot. After having finished his book, the fictional author Jerome F. Davis started believing he was being controlled by an outside force and that his wife was spiking his drinks, making him more susceptible to being controlled at "the behest of a demon called Pax." This paranoia eventually led him to murder his wife, a tragedy that is discussed in one of the first scenes in the film [22]. As the plot progresses, Stefan too starts developing a similar paranoia, leading to the crucial scene where he asks which force is in control, after refusing to follow the input of the audience.

The similarity in the growing paranoia of Jerome F. Davis and Stefan is of course striking, and it is worth noting that their respective "demons" Pax and PAC (the abbreviation for the film's "Program and Control" experiment) are also near homophones. In one plotline, Stefan discovers that he is a subject of the PAC experiment, meaning that his entire reality was fabricated by scientists and actors, even the traumatising milestones, such as his mother's death in an accident. In a Truman-Show-like twist, Stefan learns that everything in his life was controlled by the unethical research scheme that has distorted his perception of reality and control throughout his life.

The theme is also hinted at visually, with the symbolism of the branching narrative structure following the protagonist throughout. With the existential questions about free will and control becoming the focal point of the film, it appears appropriate to have a branching structure that undermines the audience's sense of being in control of the narrative at certain stages. Therefore, it can be argued that the thematic choice of *Bandersnatch* is making a virtue out of its limited agency, by justifying the inconsistencies in user agency with the theme, which reflects precisely on these concepts. However, this design for agency will not generalize to works that try to engage with different themes. For this reason, it is important to look at improving agency, so that the format can express stories beyond those that have to do with free will.

## 6. Reflection on different approaches to agency

In the past, agency has been given to audiences and users of IDNs in different forms and to different extents. For instance, in *Bandersnatch*, we may argue that agency is somewhat limited due to the binary nature of the choices given in the top-down system, which in turn raises the question about possible alternative approaches to agency. In *Bandersnatch*, the extent of audience agency is quite obvious, as the interface informs when a choice point is reached and gives two options to choose from. The respective action takes place immediately after, making the audience aware of the control they have over the film.

By examining other IDNs, we can observe that approaches to agency can have various forms and that agency can be granted through different means. A different approach to agency is observed in the video game *Silent Hill 2* (2001), where the players have so-called "invisible agency," a term coined by Sercan Şengün. In this title, the system attempts to assess and model the players' psychological states based on their tendencies and behaviour while playing by maintaining state and then ultimately unlocks one of the different endings accordingly [21]. While the bulk of the game is largely linear in its narrative progression, the endings are provided in the same way as the ending in a typical Branch and Bottleneck structure (see Fig. 3). In the case of *Silent Hill 2*, the chosen branch is not an explicit choice but depends on cumulative effects of a type of psychological player modelling performed during the linear narrative part of the game. In short, as Şengün explains, "the choices the player makes are actually projected tendencies and they accumulate results in the long run" [21, pp. 183–184].

In the *Mass Effect* franchise (2007–2017), a similar approach to agency is employed, as the decisions of doing side quests, behavioural patterns as well as the engagement in dialogue trees influence the narrative. In the original *Mass Effect* trilogy, the chosen option from the dialogue wheel would help assess the player's morality and place them on the path of a "Paragon" or "Renegade" accordingly. These paths have immediate effects but also later alter the way the narrative progresses, for example by affecting the available choice of allies as the game moves forward [23]. The difference to *Silent Hill 2*'s invisible agency is that *Mass Effect*'s dialogue wheel presents an obvious interactive interface, and its agency therefore no longer seems invisible in all instances where it is given, even if it also has consequences that are not immediately obvious.

Another interesting IDN is the Danish interactive film *Switching* (2003). This film is presented as a DVD and revolves around a strained relationship between Frida and Simon, in which both appear to be stuck. This title is unusual in that it has no on-screen interface to enable interaction, but instead offers cues embedded in the dramatic performance. To affect the story, viewers can press the Enter/OK button on their DVD remote control when they wish to change the course of the film at choice points. These choice points can be recognized through clues in the actors' expressions, as they appear to dissociate or zone out for a brief moment to allow the audience to take control of the plot. The film itself never comes to an end, as the audience gets stuck in a maze of never-ending loops (see Fig. 4) of the relationship with the couple itself [24]. The way that *Switching* is laid out allows for the choice between passive consumption and active intervention at each subliminally presented choice point. However, users do not know what they would achieve by intervening, nor do they know if they influence anything, since this format does not inherently offer feedback once an interaction has taken place. Therefore, it can be argued that audiences only become aware of their influence after several replays during which they interacted differently and observed narrative changes as a result. Consequently, this approach to agency may be considered "obscured agency."

For the enactive cinema installation *Obsession* (2005), audiences were given a form of paradoxical agency, as they have no real control over their choice but are aware that they have an influence over the narrative. With the help of biosensors, this interactive installation measures physical responses of the audiences' bodies to determine what

their reactions are to certain scenes. Based on this assessment, the plot moves further into a calculated direction [25]. This type of agency can be considered involuntary, because the audience's bodies take the upper hand, and the audience themselves cannot deliberately manoeuvre their way to their desired path. In this paper, this approach to agency will be referred to as "involuntary agency."

## 7. Approaches to increased agency

The purpose of this paper is to identify different approaches to agency and assess their suitability for titles like *Bandersnatch*, a nonlinear, highly restrictive, branching structure film, in order to improve the perceived agency. The restrictions on agency in *Bandersnatch* stem from the binary nature of the choices, as well as further restrictions that enforce a given narrative path and do not allow for alternatives altogether. Furthermore, certain consequences of choices do not seem to correlate with the audience's decisions and can thus be deemed arbitrary. Though one may refute this critique of *Bandersnatch* in particular as a thematic choice used to reflect the chaotic universe in which the film takes place, the points of critique remain valid for the general development of a model with augmented agency for titles of that format.

Obvious approaches to increase agency would be allowing for more instances in which the audience can take control of the narrative and increasing the number of controllable characters. In the interactive drama game *Heavy Rain* (2010), players can make decisions on behalf of multiple characters, although their interests are in conflict as is revealed in a plot twist in the end [26]. While *Bandersnatch* has a closing scene in which a second character, namely Pearl, can be controlled, this is done after a time jump of over 30 years, which eliminates any conflicts of interest between her and Stefan. Therefore, exploring this option in more detail, and in particular implementing it, would significantly increase production costs and would only work well if the plotlines were cleanly intertwined. Moreover, having control over multiple characters can pose the threat of being too overwhelming and hence cause the audience to lose any sense of control over the plot, which would be the opposite of the desired effect.

Another approach which *Bandersnatch* may seem to have tiptoed around – or at least reflected upon – is the idea of adding quick time events. This is seen when Stefan starts fighting his psychologist and then his father, as the player can choose between two options that would make him perform different attacks. Provided that the controls available on the devices compatible with the film allowed it, this scene could be redesigned or even elaborated by allowing the more impactful attack only if the player acted faster or succeeded at inputting a specific key-combination shown on screen. In *Bandersnatch*, both attacks trigger the same follow-up scene. Initially, as *Bandersnatch* creator Charlie Brooke said in a podcast interview with RHLSTP, the creative team wanted to add puzzles that audiences would have to solve to keep the story moving forward – comparable to escape the room games. However, after conducting the player testing this idea was discarded as audiences did not comprehend what they were expected to do [27] – arguably because this increased form of interaction was unfamiliar to the target audience of *Bandersnatch*, which includes people who do not engage with digital games and puzzles. Nevertheless, implementing quick time events – even if they would have to be highly restrictive for this format – can be an interesting feature in interactive film, especially if they lead to different succeeding scenarios. This can be observed in *Heavy Rain*, where the player is required to navigate through the chapters with one of the playable characters by finding clues, solving riddles and beating quick time events. During these playable scenes, it is up to the player's proficiency how much time is spent on them, though hints are offered if the player has spent too much time on a challenge. Therefore, the narrative momentum can be negatively impacted in *Heavy Rain*, if a player gets stuck during a playable scene. A workaround to diminish the decrease of narrative momentum would be to add a

timer to regulate how much time the player has to solve the task successfully. Implementing quick time events in *Bandersnatch* would increase interactivity in the title, however as established in section 2.2 increased (inter)activity does not correlate with increased agency. Therefore, while this idea could be a fun addition to an interactive film, it would not increase agency. Although unfavourable outcomes would be associated with failure to complete a quick time event successfully, it is usually not the player's choice, how well they perform at these tasks.

A more effective way to increase agency can arguably be reached by employing one of the approaches to agency discussed in section 6. Invisible agency can be implemented in *Bandersnatch* by tracking the intentions of the audience behind all choices they make and maintaining state of this evaluation in order to unlock suitable plotlines and endings. In this fashion, the audience's input would not only prompt an immediate response by the controllable character, but would also determine the later narrative path in accordance with the assessed behavioural pattern. Looking back at Murray's definition of agency being "the satisfying power to take meaningful action and see the results of our decisions and choices" [9, p. 159], we can conclude that every narrative choice is made "consciously and visibly and the outcome is instantly associated with it" [21, p. 180] as Şengün states. With an implementation of invisible agency, users would associate outcomes with their inputs in two separate dimensions: Primarily, the interface gives away the choices that can be made, and their direct consequences are screened immediately after, establishing a clear connection between input and output. Additionally, plotlines which are unlocked further down the line could be attributed to a cumulation of previous inputs.

The approach to agency used in *Switching* allows for a choice between passive consumption and active intervention. In *Bandersnatch*, a similar function is offered, as the audience can decide against making a choice and letting the system make a default choice for them. However, due to the interface in *Bandersnatch*, the choice points as well as the two options are obvious to the audience unlike in *Switching*. Furthermore, the default option is one of the two presented, which means that the logic of passive consumption versus active intervention as seen in *Switching* does not apply in *Bandersnatch*: Restraining oneself from making a choice (i.e., passive consumption) through refusal of active intervention, still results in one of the options being played out exactly as if the audience had actively intervened and chosen it. Therefore, in order to duplicate the form of agency used in *Switching*, it would require adding a function in *Bandersnatch* that lets the audience intervene or watch the scenario play out without knowing what the consequences of either of the options are. *Switching*'s solution of using visual clues performed by the actors during which the audience can press a button to intervene could also be implemented in *Bandersnatch*. Alternatively, the interface in *Bandersnatch* could be used by displaying an ambiguous option such as "Intervene" that could either be chosen or not. Although this design idea might be interesting for titles like *Bandersnatch* and could be very suitable if it fit well with the theme as it did in *Switching*, it would not inherently increase agency. The vague options could trigger unforeseen consequences, and if executed well, the audience might believe that they are actually responsible for them, but it seems more likely that the audience would not be able to identify with the consequences they had brought on simply by choosing to interfere or sit back. It can be argued that this approach to agency does not have much thematic flexibility, as it is best employed for titles, where not interfering would mean remaining stuck in a loop – or in an unhappy relationship, like in *Switching*.

Involuntary agency, like that pioneered in *Obsession*, is rather difficult to achieve. While biosensors have become relatively common (e.g., Fitbits, smartwatches), their narrative efficacy requires a specific setting that is free from external influences that might hinder full focus and thereby pollute the bio data. For this reason, this approach to agency does not seem suitable for interactive films that are designed to be streamed and viewed in any desired setting and location.

Based on this discussion, we can classify the different approaches to

agency regarding their flexibility, starting with how compatible they are with different devices, bearing in mind that titles that are to be released on streaming platforms, as *Bandersnatch* was on Netflix, have to be compatible with a variety of different devices. We present this summary in the form of Table 2 in which the device compatibility is broken down into “UI Requirements,” where the visual interface as well as the required controllers are assessed, as well as “State and Processing Requirements,” to analyse which approaches to agency would require

state-tracking and background processing. These two columns help narrow down the suitable platforms, as for instance gaming consoles have a fixed controller but configurable UI and comprehensive state and processing capabilities, whereas DVD players, as used for *Switching*, have a fixed controller (remote control) and limited UI and completely lack state and processing capabilities. Furthermore, the “Thematic Specificity” and the question of whether agency can be increased with these approaches (“Increased Agency”) are further elaborated in their

Table 2

Analytic assessment of flexibility of different approaches to agency.

	UI Requirements	State and Processing Requirements	Thematic Specificity	Increased Agency
<b>Multiple Controllable Characters</b>	High flexibility regarding the UI that helps users understand that they can control multiple characters. Devices must be compatible with any form of desired interaction.	High flexibility, as no state-tracking or processing is necessarily needed.	Thematic specificity only exists in the context that users might be faced with conflicts of interest that they have to resolve themselves as they are controlling multiple characters.	Could increase overall agency over the universe rather than over one individual. Threat of being too overwhelming to the audience if not executed well.
<b>Quick Time Events</b>	Required key input or motion must be displayed in the UI. Devices must allow for input of different keys or have sensors to track motions to assess motor skills.	System must be able to process the key inputs or detected motions.	Medium thematic specificity is observed here as this feature can mainly be added in action, fighting or competition scenes.	Increased (inter)activity does not correlate with increased agency.
<b>Invisible Agency</b>	High flexibility: can be implemented based on how exactly the system will collect data to create player models. Can be done with and without visible UI. Devices must be compatible with any desired form of interaction.	System must be able to track state and process gathered data immediately and as narrative progresses to output calculated plotlines and endings.	Player modelling can be based on any given criterion, therefore there is no thematic specificity. For example, in <i>Silent Hill 2</i> , the criterion is the psychology of the player because it is a psychological horror game.	Due to state-tracking the user’s input prompts immediate responses as well as calculated plotlines later on, giving the user another layer of (invisible) agency.
<b>Obscured Agency</b>	High flexibility, as choice points can be made visible with UI or be implied with narrative clues. Devices must be compatible with any desired form of interaction.	High flexibility, as no state-tracking or heavy processing is necessarily needed.	If choice points are hidden (no UI), there would be no feedback when interaction has taken place. Users decide if they intervene without knowledge of the consequences. To make sense of their agency, it is best used in looping IDN structures, rendering the thematic specificity high.	Users are unaware of the consequences of their intervention or refusal to intervene. The choice points might also be obscured, depending on whether or not an interface is added. Perceived agency is thus not increased unless the title includes loops or is replayed.
<b>Involuntary Agency</b>	Low flexibility, while no digital interface is required, biosensors are used as controllers. For accurate results, a very specific setting is needed.	Gathered data from biosensors must be processed.	Depending on which physical responses are to be measured, the only restriction here is that the title has to be likely to trigger responses.	The audience is aware that their physical responses influence the narrative, but they cannot fully control them, thus this form of agency is involuntary. Users are aware of their surrender of control.



respective columns. This table visualises the degree of flexibility of the introduced approaches to agency regarding the relevant criteria. The colours help distinguish between high (green), medium (yellow), and low (red) flexibility, for the first three criteria. For the criterion “Increased Agency,” these colours are used to visualize high, medium, or low increase of agency.

We can conclude from the discussion and the assessment in the table that the most promising approach to increased agency, with the least restrictions regarding its flexibility, is invisible agency. Moving forward in this paper, invisible agency will be explored more thoroughly regarding its implementation in *Bandersnatch* as well as titles with the same format.

### 7.1. Benefits of invisible agency in *Bandersnatch*-like titles

When implementing invisible agency, the player’s behavioural tendencies are assessed in order to unlock suitable storylines [21]. Therefore, it is vital to identify a criterion that is assessed whenever the audience makes a choice. According to Şengün, it is not advisable to base the assessment on criteria such as ethics and morality, as options offered might either be too obviously polarized and therefore not subtle enough, or they may be too similar and result in a moral dilemma that in turn creates a challenge in assessing the player’s intentions.

In *Bandersnatch*, a promising criterion for evaluation would be the willingness to take risks or the propensity towards self-destructive behaviour. These tendencies can be identified at multiple choice points, such as when Stefan is so frustrated that he would either (a) destroy his computer and with that all of his programming progress and jeopardize his imminent career plans; or (b) deal his frustration by only hitting the desk. Given the criterion, the next step is to come up with a measuring unit for the behavioural pattern that is to be assessed, calculating it and maintaining state throughout the title and then ultimately unlocking plotlines and endings that constitute meaningful consequences to the assessed intentions of the audience. By having later scenes, as well as the ending, tied to the accumulated results of previous inputs, *Bandersnatch* would no longer seem arbitrary in the causality of its events. Instead, the limited agency of the interactive film format would be increased, as meaningful results for the audience’s input would be observed.

This design strategy would require an overall restructuring of the film’s scenes in order to respond well to the user’s input. It can be entirely up to the designers at which point the evaluated intentions and risk-taking behaviour of the audience would bear consequences, but the least invasive alteration would probably occur if these consequences are displayed shortly before a potential ending is reached. The consequences could be shown in the actions that occur in the unlocked scenes, but they could also influence the presented options at decision points in said scenes.

By using invisible agency to create a more meaningful chain of causality, the sense of agency can ultimately be enhanced, however the oblivious audience would not notice it. Being oblivious is initially necessary, as players who are aware that the title has invisible agency are likely to try to manipulate the film in a certain direction once they know that their behaviour is being evaluated. In doing so, the unlocked ending would no longer reflect a player model of them. In this fashion, we would argue that it adds to the level of enjoyment not to be aware of the invisible agency when playing through the interactive film for the first time. Once the players are aware of this additional layer of agency, they might – motivated by the challenge – become more likely to replay the film in order to manipulate it, and this may in turn improve the per-title replayability of *Bandersnatch*.

As established, *Bandersnatch* has a kaleidoscopic form, meaning that audiences are encouraged to explore alternative paths upon reaching an official ending, which increases the per-scene replayability. Moving beyond this, it is also important to note that *Bandersnatch* relies on dramatic compression to accelerate the arrival at a decisive choice point,

after “respawning,” i.e., exploring a variation of the plot. This means that the audience does not have to sit through a repetition of previous scenes in order to make a change within the same playthrough. While this feature might increase the attractiveness of exploring multiple paths in one sitting, it is a double-edged sword. The constant state-tracking required for invisible agency could constrain the audience from unlocking all narrative paths in one singular playthrough, since the paths are required to match the created player models.

It is therefore worth exploring how the kaleidoscopic design can coexist with invisible agency and the generated player model. Broadly speaking, there are two options to facilitate backtracking, the first being to reset the player model either entirely, or at least discarding all information that was gathered after the choice point that the player is respawned into. The benefit of this option is that it would not limit the potential storylines that can be unlocked as severely (or even at all), because some (if not all) data used for the player model will be overwritten. The drawback, however, is that the player model could become much less accurate if gathered information is being replaced so easily. The second option is to accumulate all data about the player during one playthrough even when backtracking is involved, meaning no data is lost. Doing so also allows the system to assess increased instances of user behaviour, such as the audience’s choice to engage with the title longer, perhaps out of curiosity, lack of perceived closure or satisfaction with the reached ending. This information can then be used to further adjust the alternatively unlocked plotlines and endings. The main drawback of this approach is that by retaining all gathered data rather than overwriting some of it, the audience can be predestined to a limited number of alternative storylines early on, as only those would match their overall player models. A potential solution for this design limitation would be screening the most suitable plotlines first and gradually going over to the less suitable ones.

In order to facilitate a well-functioning form of invisible agency, the juxtaposed options at each decision point should not be obvious choices on opposite sides of a spectrum, as this would take away any possible challenge for the aware audience. By evaluating the risk-taking behaviour as a calculation of percentages rather than as a simple binary branching at each decision point, the assessment can be conducted in a more sophisticated manner. These percentages can then be accumulated to calculate the right outcome just before it is to be screened.

It is also worth exploring the differences in format, duration and pacing. *Silent Hill 2* is an over eight-hour long gaming experience in which the user’s behaviour determines the possible endings, while *Bandersnatch* is a significantly shorter interactive film of about one and a half to two and a half hours in length. However, *Bandersnatch* asks its audience to make concrete, binary choices, rather than gathering data from the way the user chooses to interact with the story world as done in *Silent Hill 2*. Therefore, though being a fast-paced title in comparison, *Bandersnatch* has the tools to assess certain characteristics in the audience more efficiently without its overall duration becoming a threat to the accuracy of the assessment.

Ultimately, the narrative momentum as previously discussed cannot be influenced in *Bandersnatch*’s format as the audience has to make a decision within a defined amount of time even if the features of invisible agency were to be added.

### 7.2. Discussion of authoring tools

Interactive films can be authored using a variety of tools, many of which are open source. Commonly used software and languages are Twine, Ink, Inform, and StoryPlaces, which can be used for different results and functionalities. For the prototyping process of *Bandersnatch*, the authoring tool Twine was used. Twine is a visual hypertext development tool which does not require programming knowledge for its basic functionalities. To add more complexity to interactive experiences creators can use one of the supported story formats (similar to scripting languages), such as SugarCube, Harlowe, and Snowman.

Referring to the implementation of invisible agency, the use of Twine as a prototyping software would still be possible, by for instance using variables to maintain state and adding conditional statements to determine which scenes are to be unlocked under which circumstances.

For *Bandersnatch* in particular, Netflix programmed its own software that according to show creator Charlie Brooker made it possible to import the code alongside the respective scenes, allowing for a smooth transition between the prototyping/authoring and production stage [27].

### 7.3. Importance of the awareness of agency

After establishing that invisible agency expects first-time users to be unaware of the player modelling feature, a question arises about the importance of the awareness of agency. Can the audience feel in control if they are oblivious of their influence? This is where a line has to be drawn between the two terms agency and control.

Having agency does not mean being in control; it merely means that “meaningful” outputs will be achieved in a dynamic system. The word “meaningful” is subject to the logic of said system, i.e., the logic of the world in which the story takes place. Therefore, the definition of the word “meaningful” must bend to the logic of the relevant story world and for a satisfying experience also make thematic sense. While many narrative outputs will be hardly predictable, as would be expected from any form of narrative, this does not diminish the level of agency the users have, even if they might feel like they were not in control. The pleasure of agency, as Murray stated, comes from “making something happen in a dynamically responsive world” [12]. It can hence be defined as the synergy of affecting the plot and in turn being affected by the overall experience [28]. This quality of affecting is not the same as being in control. The audience might be holding the strings of the controllable character(s), but this power does not translate to external forces, thereby allowing for unpredictability in the narrative, which goes against the notion of being in control.

With invisible agency, plotlines that match a certain player model of the user will be unlocked as the plot progresses. This creates a second layer through which the user can affect the plot, as their input no longer prompts only immediate responses. First-time users will likely be expected to only be aware of their power to manoeuvre the immediate responses whilst remaining unaware of their influence on the plot on a larger scale.

As agency cannot be equated with being in control, it is worthwhile to establish whether there even is a necessity for the scale of agency to be recognizable up front. Users who find out that the narrative experience they have achieved was adjusted through a modelling of them will understand that their choices affected the plot more than they initially thought. This in turn will make them understand that they have more agency than expected and as elaborated in section 7.1, might prompt them to replay the entire title, this time knowing that their choices have a more significant narrative effect.

This leads to the conclusion that invisible agency while not being perceivable for first-time users does not risk rendering the concept ineffective, as long as the system reveals this additional feature at the end of the experience, so users can become aware of their multi-faceted level of agency.

## 8. Conclusion

This paper has identified several different approaches to agency, which, if implemented for a suitable interactive title, can increase the user’s perceived agency. For highly restrictive, branching structure films, like *Bandersnatch*, we found that by adding features of invisible agency, the overall perceived agency among the users can be amplified without requiring highly invasive modifications to the title. The narrative momentum would not be jeopardized, as the UI would remain unchanged, meaning choices would still be made within the allotted time.

Furthermore, the additional layer of invisible agency could potentially lead to audiences replaying the title, as they are aiming for alternative plotlines: Provided that the audiences of interactive films can be assumed generally to be aiming for a certain narrative outcome, adding the layer of invisible agency would offer an additional challenge for the audience – especially if they are replaying the entire film or are aware of the invisible agency feature – as they would try to manoeuvre the choices carefully to get their desired result. In combination with this challenge, this solution could prove itself promising in navigating the fine line between narrative and game successfully and invisibly. Finally, implementing invisible agency in interactive films like *Bandersnatch* can contribute to the creation of more meaningful sequences of events in the instantiated narratives in accordance with the audience’s input, and thereby the overall felt agency or “free will” would be increased.

To conclude, while scarcely explored in the past, invisible agency could have the potential to elevate IDNs to more captivating and engaging titles with a higher degree of perceived agency. However, this design suggestion inevitably raises the question of what will be done with the data gathered from the assessment of the audience’s behaviour. Streaming platforms such as Netflix and Prime Video track a considerable range of user behaviours, for instance for their personalised recommendation systems [29,30]. For IDNs, especially those that rely heavily on state-tracking and processing, as would be the case if invisible agency was to be added, the in-title-behaviour of audiences would likely give the algorithm even more data about the users. Technology policy researcher Michael Veale used GDPR to formally ask Netflix to share the saved data regarding the choices he made in *Bandersnatch* and found that the streaming platform stored every single user input without indicating for how long this data would be stored [31]. Taking a step back, it is worth questioning if this further envelopment of audiences into the datafication of interactive entertainment is a desirable development, an inevitable side-effect, or something that should rather be prevented for the sake of the media format. This question could open the door to a more elaborate discussion regarding the ethical and legal grounds of data collection of IDNs through behaviour-assessments for monetisation purposes. Another important question to consider here, is if users who are aware of the invisible agency component and know that they are being profiled might be deterred from engaging with such IDNs.

Moreover, to further develop this suggested approach to increased agency, it would also be imperative to have actual user studies on invisible agency in interactive films, rather than theoretical assumptions, to be able to steer this promising design idea into the right direction in the long run.

Based on the analytical assessment of invisible agency, we can conclude that this concept is profoundly adaptable and can therefore be applicable to interactive stories with different themes. Invisible agency also offers a high degree of design freedom in terms of what the player model should be based on. For example, in the hypothetical example of adding invisible agency to *Bandersnatch*, we identified the potential to model players based on their risk-taking behaviour and tendency to be self-destructive. Moving beyond this, we recognize a potential challenge to balance the coexistence between the kaleidoscopic design and the generated player model through invisible agency. However, there are different design suggestions to increase replayability through backtracking whilst maintaining the player model, which could be elaborated, tried, and tested in the future. Nevertheless, it remains clear that due to the duality of its effect, invisible agency can heighten the feeling of “making something happen in a dynamically responsive world” [12] and therefore be a powerful tool in interactive storytelling.

## Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

## References

- [1] R. Donaghey, Netflix Is Going to Make a Lot More Weird, *Interactive Movies Likes 'Bandersnatch'*. *Vice Magazine* [Online] 2019. <https://www.vice.com/en/article/7xnq3a/netflix-more-interactive-movies-like-bandersnatch-rom-coms-todd-yellin-interview-vgtrn> (accessed Dec 15, 2020).
- [2] C. Watson, Kimmy vs. the reverend, this is the new interactive movie from Netflix. *Freemove Tips* [Online] 2020. <https://freemovetips.com/kimmy-vs-the-reverend-this-is-the-new-interactive-movie-from-netflix/> (accessed Jan 12, 2021).
- [3] CtrlMovie. <https://www.ctrlmovie.com> (accessed Dec 15, 2020).
- [4] A.M. Rezk, M. Haahr, The case for invisibility: understanding and improving agency in Black Mirror's Bandersnatch and other interactive digital narrative works. In: *Interactive Storytelling, Proceedings of the 13th International Conference on Interactive Digital Storytelling, ICIDS 2020, Bournemouth (UK), November 3-6, 2020*; A. G. Bosser, D. E. Millard, C. Hargood, Eds.; Springer: Cham, 2020; pp 178-189. <https://doi.org/10.1007/978-3-030-62516-0>.
- [5] H. Koenitz, Towards a Specific Theory of Interactive Digital Narrative. In *Interactive Digital Narrative*, 1st ed.; H. Koenitz, G. Ferri, M. Haahr, D. Sezen, T. I. Sezen, Eds.; Routledge, 2015; pp 96-101. DOI: 10.4324/9781315769189.
- [6] C. Roth, T. van Nuenen, H. Koenitz, Ludonarrative Hermeneutics: A Way out and the Narrative Paradox. In *Interactive Storytelling, Proceedings of the 11th International Conference on Interactive Digital Storytelling, ICIDS 2018, Dublin, December 5-8, 2018*; R. Rouse, H. Koenitz, M. Haahr, Eds.; Springer: Cham, 2018; pp 93-106. DOI: 10.1007/978-3-030-04028-4.
- [7] D. Fox Harrell, J. Zhu, *Agency Play: Dimensions of Agency for Interactive Narrative Design*, in: *Intelligent Narrative Technologies II, The AAAI Press, 2009*, pp. 44-52.
- [8] M. L. Ryan, From Narrative Games to Playable Stories: Toward a Poetics of Interactive Narrative. In: *Storyworlds: A Journal of Narrative Studies*, 2009, Vol. 1, pp 43-57. <https://www.jstor.org/stable/25663007> (accessed Dec 15, 2020).
- [9] J.H. Murray, *Hamlet on Holodeck: The Future of Narrative in Cyberspace*, 2nd ed., MIT Press, Cambridge and London, 2017.
- [10] N. Knoller, U. Ben-Arie, The Holodeck is all Around Us—Interface Dispositifs in Interactive Digital Storytelling. In *Interactive Digital Narrative*, 1st ed.; H. Koenitz, G. Ferri, M. Haahr, D. Sezen, T. I. Sezen, Eds.; Routledge, 2015; pp 51-66. DOI: 10.4324/9781315769189.
- [11] G. N. Yannakakis, P. Spronck, D. Loiacono, E. André, Player Modeling. In *Artificial and Computational Intelligence in Games*; S. M. Lucas, M. Mateas, M. Preuss, P. Spronck, J. Togelius, Eds.; Dagstuhl Publishing, 2013; pp 45-60. DOI: 10.4230/DFU.Vol6.12191.45.
- [12] J. H. Murray, Janet H. Murray Humanistic Design for Emerging Medium. Glossary. <https://inventingthemedium.com/glossary> (accessed Dec 28, 2020).
- [13] S. K. Ashwell, Standard Patterns in Choice-Based Games. *These Heterogenous Tasks* [Online] 2015. <https://heterogenous-tasks.wordpress.com/2015/01/26/standard-patterns-in-choice-based-games/> (accessed Dec 18, 2020).
- [14] C. Roth, H. Koenitz, Bandersnatch, Yea or Nay? Reception and User Experience of an Interactive Digital Narrative Video. In *TCX'19, Proceedings of the 2019 ACM International Conference on Interactive Experiences for TV and Online Video*, Salford (UK), June 5-7, 2019, Association for Computing Machinery, 2019; pp. 247-254.
- [15] J. H. Murray, Research into Interactive Digital Narrative: A Kaleidoscopic View. In *Interactive Storytelling, Proceedings of the 11th International Conference on Interactive Digital Storytelling, ICIDS 2018, Dublin, December 5-8, 2018*; R. Rouse, H. Koenitz, M. Haahr, Eds.; Springer: Cham, 2018; pp 3-17. DOI: 10.1007/978-3-030-04028-4.
- [16] A. Mitchell, L. Kway, "How do I Restart This Thing?" Repeat Experience and Resistance to Closure in Rewind Storygames. In *Interactive Storytelling, Proceedings of the 13th International Conference on Interactive Digital Storytelling, ICIDS 2020, Bournemouth (UK), November 3-6, 2020*; A. G. Bosser, D. E. Millard, C. Hargood, Eds.; Springer: Cham, 2020; pp 164-177. DOI: 10.1007/978-3-030-62516-0.
- [17] J. H. Murray, Janet Murray responds in turn, *Electronic Book Review* [Online] 2004. <http://electronicbookreview.com/essay/janet-murray-responds-in-turn/> (accessed Feb 2, 2021).
- [18] J. H. Murray, Why Paris Needs Hector and Lancelot Needs Mordred: Using Traditional Narrative Roles and Functions for Dramatic Compression in Interactive Narrative. In *Interactive Storytelling, Proceedings of the 4th International Conference on Interactive Digital Storytelling, ICIDS 2011, Vancouver, November 28 - December 1, 2011*; M. Si, D. Thue, E. André, J. C. Lester, J. Tanenbaum, V. Zammito, Eds.; Springer: Cham, 2011; pp 13-24. DOI: 10.1007/978-3-642-25289-1.
- [19] E. Short, Bandersnatch (Netflix). *Emily Short's Interactive Storytelling* [Online] 2019. <https://emshort.blog/2019/02/19/39189/> (accessed Dec 15, 2020).
- [20] L. Kohlhoff, F. Nack, How Relevant Is Your Choice?: User Engagement and Perceived Agency in Interactive Digital Narratives on Video Streaming Platforms. In *Interactive Storytelling, Proceedings of the 12th International Conference on Interactive Digital Storytelling, ICIDS 2019, Little Cottonwood Canyon (USA), November 19-22, 2019*; R. E., Cardona-Rivera, A. Sullivan, R. M. Young, Eds.; Springer: Cham, 2019; pp 73-85. DOI: 10.1007/978-3-030-33894-7.
- [21] S. Şengün, Silent Hill and Curious Case of Invisible Agency. In *Interactive Storytelling, Proceedings of the 6th International Conference, ICIDS 2013, Istanbul, November 6-9, 2013*; H. Koenitz, T. I. Sezen, G. Ferri, M. Haahr, D. Sezen, G. Çatak, Eds.; Springer: Cham, 2013; pp 180-185. DOI: 10.1007/978-3-319-02756-2.
- [22] A. Romero, WTF is the Pax Demon in Black Mirror Bandersnatch? *Refinery29* [Online] 2018. <https://www.refinery29.com/en-us/2018/12/220437/pax-demon-black-mirror-bandersnatch-netflix-real-pac> (accessed Jan 29, 2021).
- [23] B. Makedonski, 9 out of 10 people played Mass Effect as Paragon. *Deconstructoid* [Online] 2020. <https://www.deconstructoid.com/9-out-of-10-people-played-mass-effect-as-paragon-581278.html> (accessed Dec 27, 2020).
- [24] Switching. <https://web.archive.org/web/20201127234605/http://www.switching.dk/en/> (accessed Jan 2, 2021 through Wayback Machine's calendar entry of Nov 27, 2020).
- [25] Enactive Cinema. <http://www.enactivecinema.net> (accessed Dec 29, 2020).
- [26] L. Kietzmann, Interview: Spoiling Heavy Rain with David Cage. *Engadget* [Online] 2010. <https://www.engadget.com/2010/03/19/interview-spoiling-heavy-rain-with-david-cage/> (accessed Dec 18, 2021).
- [27] R. Herring, RHLSTP 268 - Charlie Brooker. *RHLSTP* [Podcast] 2020. <https://play.acast.com/s/rhlstp/rhlstp268-charliebrooker> (accessed Nov 1, 2021).
- [28] H. Koenitz, What Game Narrative Are We Talking About? An Ontological Mapping of the Foundational Canon of Interactive Narrative Forms. In: *Gaming and the Arts of Storytelling: Special Issue*, D. Jayemanne, Ed.; Arts, 2019; pp. 4-14. DOI: 10.3390/arts7040051.
- [29] Netflix Help Center. <https://help.netflix.com/en/node/100639> (accessed Jan 28, 2020).
- [30] D. Chong, Deep Dive into Netflix's Recommender System. *Towards Data Science* [Online] 2020. <https://towardsdatascience.com/deep-dive-into-netflixs-recommender-system-341806ae3b48> (accessed Feb 5, 2021).
- [31] M. Gault, Netflix Has Saved Every Choice You've Ever Made in 'Black Mirror: Bandersnatch', *Vice Magazine* [Online] 2019. <https://www.vice.com/en/article/j57gkk/netflix-has-saved-every-choice-youve-ever-made-in-black-mirror-bandersnatch> (accessed Feb 3, 2021).