INSIGHTS INTO SERIAL NARRATIVES THROUGH QUALITATIVE MODELLING TECHNIQUES

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ABSTRACT
Serial narratives can often be seen as narrative ecosystems with a long lifespan and whose transformation and evolution can be based on external factors (relating to their media, economic and reception contexts) as well as internal ones (narrative aspects, the evolution of characters and of the plot). Considering the paradigm of narrative ecosystems, this work is a preliminary investigation regarding serial narratives, conducted through the application of a qualitative modeling technique (loop analysis), developed within the ecological domain.

Loop analysis is proposed as an innovative method for the analysis of narrative ecosystems, and its aim is to reconstruct their evolutionary dynamics by implementing models able to consider the heterogeneity of all possible variables (narrative, text, productive, economic spheres etc.). This paper presents two goals: (i) highlighting, through a step-by-step methodological process, the systemic approach of loop analysis, which could help to identify successful trends by modeling them in an evaluative/predictive perspective, and (ii) preliminarily applying said method to the TV series *Game of Thrones* (HBO, 2011-2019).

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Very often, TV series become fully fledged narrative ecosystems (Innocenti and Pescatore 2012a, 2018, Pescatore et al. 2014, Pescatore 2018) that are durable, inspire public debate and productive practices in fandoms, and prolong narratives, transforming them from season to season. Within the study of contemporary serial productions emerges a need to determine and evaluate the multiple relations existing among all elements involved (text, narrative, economic spheres and aspects related to production, circulation, audience and social discourse). The interconnection among the various aspects allows serial products to change and evolve, due to both internal perturbations and restrictions (related to the narrative material) and external factors (related to the media context) (Innocenti and Pescatore 2012a, 2018, Ruffino and Brembilla 2015, Pescatore and Rocchi 2018).

Within this systemic approach, it is fundamental to adopt methods that are able to capture the system in its entire complexity and, at the same time, to consider heterogeneous variables. Nevertheless, considering the system of serial narratives, we find that some components are often difficult to quantify in terms of variables (how does one measure, for instance, a variable that takes into account the level of pathos in a narrative?) and of the links between them (how does one estimate the effect of audience on narrative aspects?).

This paper is a preliminary study aimed at applying a qualitative modeling technique (loop analysis) to investigate serial narratives. Qualitative modeling, different from quantitative modeling, favours generality and realism to precision (Levins 1966, Bodini et al. 2007).

In the first part of the paper we will tackle the method by schematically identifying the steps that are necessary to its application; subsequently, we will refer to the TV series *Game of Thrones* (HBO, 2011-2019) as case study.

METHOD: LOOP ANALYSIS

Loop analysis is a qualitative modeling method that has developed within the ecological and environmental domain thanks to Levins (1974, 1975) and Puccia (Puccia and Levins 1985), and allows to predict the evolution of equilibrium values of system variables following perturbations (inputs) that happen by changing one or more parameters in the growth rate of the variables. Inputs can be positive, negative, and be caused by external agents, or by endogenous modifications. Because of the connections that functionally link the components of the whole system, inputs may propagate beyond their direct targets to all the variables under exam. Loop analysis identifies these connections and allows to understand if the equilibrium value of system variables is expected to increase, decrease or remain the same following the perturbation. The algorithm that allows this kind of prediction uses the properties of the graph created on the basis of the knowledge of the system under analysis.

Investigation through qualitative models of loop analysis on TV series is in its preliminary phase and it is composed of various steps, organized as follows.

STEP 1. Identification of the variables of interest, named system *nodes*. Loop analysis allows us to build models composed of both homogeneous (considering, for instance, narrative-only variables) and heterogeneous variables, which makes it possible to track and integrate relevant aspects of serial narratives (e.g. aspects related to languages, production, economics and consumption).

STEP 2. Creation of qualitative *links* between variables and graph making. Qualitative models only use the sign of the interactions among variables and represent them as a graph with nodes and oriented links (Figure 1a). To indicate that linkages possess a magnitude, they are associated with coefficients (e.g. +/- a_{12}), where the sign is consistent with the type of link. Referring to the graph in Figure 1a, links represented by an arrow identify the positive effect that a variable (e.g. X_1) have on the other one (e.g. X_2), and they are associated with a positive coefficient (a_{21}); on the other hand, the links representing the inhibition of a certain variable (e.g. X_2) on the other one (e.g. X_1) are associated with a negative coefficient ($-a_{12}$). The first subscript of the coefficient identifies the variable subjected to the effect, the second subscript indicates the variable producing the effect. For instance, if we consider the ecological domain - where this method was first developed - we can see the graph of Figure 1a as a representation of a prey-predator system, where the two nodes are linked by an arrow that identifies the positive effect the prey (X_1) has on its predator (X_2), and by a link with a bullet at its extremity indicating the inhibitory effect of the predator on the prey. When dealing with natural ecosystems, building qualitative models is relatively easy thanks to the fact that interactions can be observed in the natural environment (Pescatore and Rocchi 2018: 243-4). When considering serial narratives, recognising objective links that can be identified and reported among

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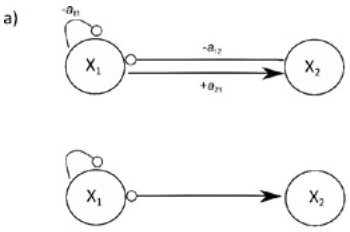

b)

"Community matrix"

	X_1	X_2
X_1	-1	1
X_2	-1	0

c)

"Table of predictions"

	X_1	X_2
X_1	0	+
X_2	-	+

FIGURE 1. LOOP ANALYSIS

(a) graphs showing the interaction between prey (X1) and predator (X2), the second graph refers to the synthetic notation used in this work; (b) community matrix; (c) table of predictions.

the model variables is not an easy task and it is currently under investigation. The reported links are hence due to an abstraction operated by the analyst on the basis of in-depth research concerning the analysed system (bibliography, interviews, data, etc.)

STEP 3. Building the community matrix. Coefficients associated with links identified during STEP2 are entered into an NxN matrix (where N is the number of variables), also called community matrix (Figure 1b). Each graph is therefore associated with a community matrix where the rows stand for the variables starting the effect, while the columns are the variables that undergoing the effect. Therefore, X_1 has a negative effect (-1) on itself because of negative autoregulation, while it has a positive effect (+1) on X_2, as established by the links. The zero (0) indicates the absence of effect of the row variable on the column variable.

STEP 4. Defining the inputs. In biological systems, an input is defined as the alteration of one or more parameters that determines the variation of a variable's growth rate. When applying loop analysis to serial narratives, we need to find a parameter that can be considered equal to the growth rate in biological systems. In this work we will explore different types of inputs (real and hypothetical).

STEP 5. Building tables of predictions. Any system variable can be the target of perturbations, and when an input (positive or negative) acts on a variable there can be consequences, both on the target variable and on the variables that directly or indirectly interact with it. It strongly depends on the structure of the interactions between the components of the system under analysis. The effect can be evaluated by identifying paths[1], circuits[2] and feedbacks[3], in terms of qualitative variations and in the levels of variables abundance (growth, reduction, no variation). For each variable, these modifications can be calculated by the prediction algorithm of loop analysis[4] and are organized in tables called tables of predictions (Figure 1c). The entries of any table of predictions denote variations expected in the level (e.g. biomass) of all column variables in response to positive parameter inputs affecting any

1 A path is a combination of edges that start from one node and arrive at another node without crossing intermediate nodes more than once (Puccia and Levins 1985). In a system there are paths of different lengths, and their identification is of fundamental importance as these are ways of propagation of impacts.

2 Circuits are closed paths that start from a node and, following the direction of interaction links, return to the same node without crossing intermediate nodes more than once (Puccia and Levins 1985).

3 Each circuit is always associated with a feedback, that phenomenon that tends to inhibit (negative feedback) or amplify (positive feedback) the consequences of initial perturbations. If we define stability as the ability of a system to maintain a lasting asset despite the occurrence of perturbative events, negative feedbacks perform a stabilizing action, while positive ones tend to make the system unstable. The nature of the feedbacks represented in the graph determines the stability or instability of the equilibrium of the system. To establish whether the system is stable or not, it is therefore necessary to calculate the sign of the feedbacks associated with the circuits that compose it. For an in-depth dissertation on the sign calculation and on stability criteria of a graph refer to Levins 1974, Puccia and Levins 1985, Bodini et al. 2007.

4 For each variable the modifications are calculated using the loop formula: $\frac{\delta x_j}{\delta c} = \frac{\sum_{i,k}\left[\frac{\delta f_i}{\delta c}\right]\times\left[p_{ji}^{(k)}\right]\times\left[F_{n-k}^{(comp)}\right]}{F_n}$ In addition to the input sign, indicated by the term [∂fi / ∂c], the loop analysis formula uses structural elements that can be identified in every graph: circuit, maximum feedback, path and complementary feedback. The latter is the maximum feedback of the complementary system, which includes all the nodes that are not part of the path that connects the variable subject to input - called the entry variable - with the variable on which we want to make a prediction of the impact - effect variable. In the above equation [∂fi / ∂c] indicates the sign of the input (positive or negative) acting on the growth function of the input variable *i*; $\left[p_{ij}^{(k)}\right]$ is the sign of the path linking the variable subject to the input (entry ariable) with variable j on which the impact prediction is to be made (effect variable), and which crosses *k* variables. The last factor in the numerator is the complementary feedback $F_{n-k}^{(comp)}$, which amplifies or reverses the effect of the path. The signs of these factors must be multiplied between them and, finally, everything must be divided by the sign of the maximum feedback of the F_n system, which measures the inertia of the entire system to changes. For an in-depth dissertation on the algorithm and examples, see the specific literature (Puccia and Levins 1985, Bodini et al. 2007: 46-56).

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row variable. Conventionally, the calculation considers positive inputs; consequences of negative inputs can be obtained by simply reversing the signs in the table. Tables of predictions are useful to provide a complete picture of the expected changes in the level of all the system variables under the effect of press perturbations on target variables. In Figure 1, we can see how a positive input acting on X_1 (for example, within the ecologic domain, an increase in the growth rate of the population of preys) is expected to increase the level of X_2 (indicating the population of predators), but doesn't modify the abundance of the entry variable; a positive input on X_2 (increase in the growth rate of the population of predators) is expected to decrease the abundance of X_1 (population of preys), but is estimated to increase the level of X_2. It is possible that the tables contain some question marks, which indicate that it is not possible to define the sign of the direction of the variable change following an input, because of multiple paths between the entry variable and the effect variable, which bear an opposite sign (effect). Ambiguity can be resolved through a numeric simulation based on assigning random numerical values to the coefficients of the community matrix[5] (linkages coefficients of the graph) and the definition of threshold values for the final prediction to be included in the prediction table[6] (Rocchi 2017: 81-2).

STEP 6. Model validation. The final step is important to check the reliability of the modeling process and can be achieved by building a database able to compare real data with expected variables changes found in prediction tables. Within the ecological domain, this step is considered to be particularly critical as history series concerning all biological populations considered in the model are not always available, and considering serial narratives, it can be challenging because of scarcity of data.

GAME OF THRONES: A CASE STUDY

The TV series *Game of Thrones* debuted in April 2011 on HBO with an episode entitled "Winter is Coming" (1.01), a motto that ended up representing the whole production, winner of a Golden Globe (Picone 2014: 27) and 47 Emmy Awards. *Game of Thrones* has since then gained international success, being distributed in more than 170 countries and having become a cult product on a global scale: the series managed to achieve more than television success, as demonstrated by the increase in tourism in Northern Ireland – where much of the filming took place – or by new trends in female baby names, emerged a year after the debut of the series in the United States, like Khaleesi and Arya (Poli 2015: 20-2). *Game of Thrones* is a *high concept tv series* (Innocenti and Pescatore 2012b: 30), a *fantasy drama* characterised by strong realistic elements (Brembilla 2018: 93, Poli 2015: 31-2).

The *Game of Thrones* phenomenon has fascinated and intrigued many researchers and enthusiasts and it also pushed them to analyse this narrative ecosystem through a variety of different methodological approaches. There are studies related to the reception of micronarratives of teasers and trailers released before the series (Pérez 2013), the relationships among characters through network analysis (Beveridge and Shan 2016), the architecture of information and the design of the narrative (Casoli 2017), celestial mechanics (Freistetter and Grützbauch 2018), the risk factors associated with mortality according to the different Houses (Angraal et al. 2018), the geopolitics and the issue of power in TV series (Picone 2014), the cultural debate about rape culture and media representation of sexual violence (Ferreday 2015), feminism (Frankel 2014), and the philosophical issues behind the series (Irwin and Jacoby 2012). This work will analyse the narrative ecosystem of *Game of Thrones* through loop analysis, taking into consideration the way relationships among narrative and economic aspects meet so as to evaluate the possible narrative developments predicted for the eighth and final season, which will be released in April 2019[7]. How will the production invest the 15 million dollars per episode envisaged for the final season and what will be the consequences from the point of view of the narration?

The first step of the modeling process consists in the identification of the variables of interest, which in this context means economic and narrative variables. The first refer to one of the most important practical issues regarding the

5 This procedure is performed N x 1000 times, where N is the number of variables of the model. The generated community matrixes are accepted and inverted if and only if they meet certain stability criteria. For an in-depth dissertation on the simulation process refer to Rocchi 2017: 81-2.

6 For each simulated and accepted matrix a prediction table is produced, where responses of the variables are given without ambiguity. Subsequently, a global prediction table is produced by combining the prediction tables obtained from the simulation based on the percentage of signs. For each prediction, if all the matrixes (100% of the cases) bear the same sign (+ or -), the direction of the change (that is the prediction) is easily assigned (+). However, there are cases in which for the same prediction some matrixes provide a sign (+) and another part returns an opposite sign (-). The final decision on the prediction, to be included in the global prediction table, is made on the basis of the percentages following the threshold values (Rocchi 2017: 81-2).

7 At the time of writing of this paper the eighth season is not yet released.

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cinema or TV transposition of *Game of Thrones:* budget. The initial investment for the project was of about 6 million dollars per episode, with an estimated cost of between 5 and 10 million dollars for the pilot. The first season (ten episodes of about 60 minutes) cost approximately between 50 and 60 million dollars (Picone 2014: 29). After the series gained international success, the budget kept on rising and reached 10 million dollars per episode for the seventh season. It is believed that production costs for the eighth and last season reached 15 million dollars per episode (Ryan and Littleton 2017), with six 80 minutes-long episodes. Within the complex contemporary serial narratives, the diegetic component is influenced by external variables like production costs (for example settings and special graphic effects), actors and fandom. As for the economic aspects, we decided to consider only one variable, that is the economic resources invested in special effects (E), which proved to be a strong pillar of the series thanks to CGI (Computer-Generated Imagery), essential to create the dragons.

As far as narrative variables are concerned, the series has tried to follow George R.R. Martin's *A song of ice and fire* until the fifth season, then from the sixth season it has opened to a broaden range of narrative possibilities. By following the indications Martin himself provided during various interviews, it is possible to outline three main plots: the war plot (WP), the fantasy plot (FP) and the soap plot (SP). The war plot (WP) refers to events related to battles, duels and wars, regardless of the characters involved, being them humans or fantastic creatures[8]. An example of a duel can be found in the episode "The wolf and the lion" (1.05), where Ser Loras Tyrell fights against Gregor "The Mountain" Clegane during the Tourney of the Hand. During the series, many other duels take place, like the one that sees again "The Mountain" battling Oberyn Martell in "The Mountain and the Viper" (4.08). War is about to start, and the episode "Blackwater" (2.09) gives the audience a clear idea of how spectacular battles in *Game of Thrones* can be, when Stannis Baratheon's fleet tries to conquer the city of King's Landing during the Battle of Blackwater. As for the fantasy plot (FP), it refers to events involving fantastic creatures (dragons, dire wolves, giants, Children of the Forest, etc.) and "magical" elements in general. In the first episode "Winter is coming" (1.01) the audience is already introduced to a fantasy world by hinting to the Others, but it is with the birth of the dragons in the final episode of the first season "Fire and blood" (1.10) that the fantastic element blossoms. Magic arrives in Westeros with Melisandre giving birth to a Shadow in "Garden of bones" (2.04), while Bran Stark starts having visions of a raven with three eyes in "Cripples, Bastards, and Broken Things" (1.04). Other fantastic creatures will soon arrive, like giants accompanied by mammoths in "The watchers on the wall" (4.09). The seventh season closes with an enormous army of Others approaching the Barrier, followed by Viserion, the undead dragon, in "The dragon and the wolf" (7.07). Lastly, the soap plot (SP) can be identified in all major situations where we find romantic relationships, tactics, intrigues and fights for power that do not present elements of magic of fantasy, but rather play on social hierarchies and chivalrous values[9]. It is clear from the beginning that the issue of power is a central one in *Game of Thrones*, and in "Winter is coming" (1.01) the scene showing lord Eddard Stark accepting the title of Hand of the King proves it: other events follow, for example the moment when Eddard himself has to write down King Robert's will and eventually modifies it, following the discovery of the incestuous relationships occurring within the Lannister household in "You win or you die" (1.07). Another crucial moment for the series is the death of King Joffrey in "The lion and the rose" (4.02). The story of Westeros is also full of intrigues to get to the control of the Seven Kingdoms. Counsellors themselves are not immune from the "game of thrones", and Varys himself will sail towards Essos with Tyrion Lannister in "The Children" (4.10), finding there both the counsellors of Daenerys, "mother of dragons". The war plot (WP), the fantasy plot (FP) and the soap plot (SP) do not exhaust the narrative potential of the series, instead they represent three intertwining plots that revolve around the running plot of the battle among Households for the supremacy and the conquest of the Iron Throne.

After having identified the variables (WP, FP, SP, E), we proceed with building the model and explicating the relations through the graph (Figure 2a) and the community matrix (Figure 2b, 2d).

As already seen for the identification of the variables, also the choice of links took the words of George R.R. Martin into consideration, by considering the genre of the series and its characteristics. The author defined his *A song of ice and fire* as an epic fantasy that includes the historic novel inspired by

8 If we consider fantasy creatures as part of the war plot, we have to picture an overlap between the two plots (WP and FP), as it happens for example with the war with White Walkers.

9 We did not contemplate to split power intrigues and romantic relationships into two plots, as the latter result as part of the first ones: there is not an autonomous "romance" dimension not related to power. When we talk about "soap plot" we mean to synthetize the substantial merging of the two.

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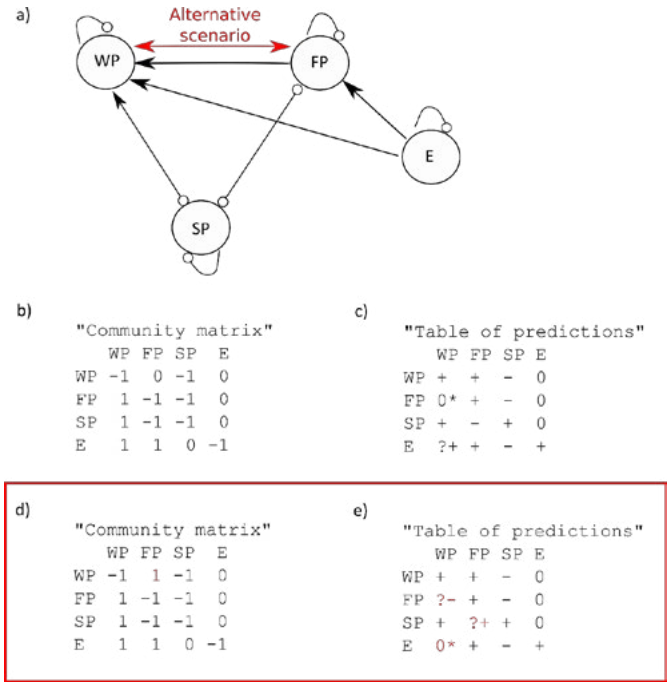

FIGURE 2

a) *Game of Thrones* graph with four identified nodes – special effects (E), war plot (WP), fantasy plot (FP) and soap plot (SP) – connected by oriented linkages. In red are underlined the differences between scenario1 and scenario2: b) and c) show the community matrix and the table of predictions for scenario1, while d) and e) show community matrix and table of predictions for scenario2 (the differences with the first one are depicted in red).

Medieval times (with the aim of making the plot more realistic) and the typical elements of fantasy:

> It's definitely a fantasy novel. It has dragons and so forth in it. It does have the feel of historical fiction. I love history. [...] Most epic fantasy or high fantasy has a quasi-medieval setting. Ever since Tolkien and The Lord of the Rings. So, in that sense, it's squarely in the tradition of many of the writers that have gone before. What I try to do is give it a little more of the feel of historical fiction than some of those other books had before it which have, I suppose, a more fantasy or fantastic feel. My take on the genre has somewhat less magic and sorcery onstage and more emphasis on swordplay and battles and political intrigue and the characters. [...][10].

10 January Magazine, http://januarymagazine.com/profiles/grrmartin.html

It seems plausible to consider a relationship of mutual inhibition between the fantasy plot (FP) and the soap plot (SP), as these variables compete for narrative space. As for the soap plot (SP), one could consider the political and sentimental contrapositions as resources, that is as narrative material able to feed the war plot (WP). The soap plot (SP) and the war plot (WP) find themselves in a predation relationship, where SP has a positive effect on WP, while WP has a negative effect of SP because it diminishes SP's narrative space. As far as the relationships between WP and FP are concerned, it seems reasonable to hypothesize two possible scenarios (Figure 2a). Scenario1 (defined by the black links in Figure 2a) sees a positive effect of FP on WP, and not vice versa, which underlines the fact that part of the fantasy plot creates the basis on which to install the war plot it overlaps with (considering, for example, the battles involving fantastic creatures). Considering *Game of Thrones* as an epic fantasy, scenario2 (the same as scenario1 except for red elements in Figure 2a, 2d, 2e) contemplates – besides the positive effect of FP on WP – also a positive effect of WP on FP, so as to underline a cooperation relationship where both elements get benefits (in terms of narrative space). The necessary assumption to understand this orientation of linkages is that of thinking of *Game of Thrones* as the mixture of more genres, where the epic fantasy builds up around the war plot (WP) and the fantasy plot (FP).

In an interview (Cogman 2012: 5), Martin explains the difficulties of TV transpositions because of the elevated costs. *Game of Thrones* has seen an increase in budgets after the first season, where the fantasy element is not as present (Marino and Gotti 2016: 350-1) when we compare it to the subsequent seasons, where the fantasy plot is enhanced. Special effects (E) have a positive effect both on the fantasy plot (FP), which benefits most from graphics – dragons, says David Benioff, "were the most important special effect in the whole of the first season" (Cogman 2012: 177) even though they only make an appearance in the final episode – and on the war plot (WP). As pointed out by director Neil Marshall when talking about the creation of the Battle of Blackwater, which cost 8 million dollars (Poli 2015: 145), "you have to fight against the clock and use all the funds as best as possible to tell the story using all the possible cinematographic tricks" (Cogman 2012: 113). In graph shown in Figure 2a, each variable negatively auto-regulates because it is characterised by time limits dictated by the format (narrative variables) and by economic limits (no more resources for special effects).

Considering the tables of predictions (Figure 2c, 2e) the objective is understanding if and how an increase in budget,

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or an increase in the economic resources dedicated to special effects (positive input on variable E) could expand within the narrative ecosystem under study, and in particular as for the narrative material. Following a positive input on E, both in scenario1 and scenario2 we expect an increase (+) in the fantasy plot (FP) and a decrease (-) in the soap plot (SP), while the war plot (WP) tends to increase (?+[11]) for scenario1 and not to change (0*) in scenario2. If we assume positive inputs on the three plots both in scenario1 and in scenario2, special effects (E) are obviously not affected. When analyzing the table of predictions along the columns (where it possible to understand which inputs affect the nodes of the model in terms of changes), it is interesting to note how the variable of the soap plot (SP) is expected to decrease following positive inputs acting on all variables (WP, FP, E) both in scenario1 and scenario2. Considering impacts on the fantasy plot (FP), it is possible to see how the predictions always consider an increase when taking into account positive inputs on WP and E both in scenario1 and scenario2, while there are different predictions between the two scenarios if we consider a positive input on SP (FP is expected to decrease in scenario 1 and generally to increase in scenario 2). The variable of the war plot (WP) is the one that presents the greatest differences between the two scenarios: WP is expected to increase for positive inputs on SP in both scenarios, while considering positive inputs on FP it is expected not to change in scenario1 and generally to decrease in the scenario2. Differences pointed out in the table of predictions are interesting, and the relationships established between the war plot (WP) and the fantasy plot (FP) will have to be analysed in depth and verified through further investigations.

On the basis of the developed model and considering the predicted increase in economic resources destined to special effects, an increase in the narrative biomass regarding the fantasy plot and a reduction in the soap plot is expected for last season of *Game of Thrones*, while the war plot presents non-homogeneous predictions that will be subject to further investigations. All we have to do is wait for the release of the eighth season in order for us to evaluate the predictive results of the loop analysis model and assess which scenario best describes the narrative ecosystem of *Game of Thrones*.

11 The positive input on E yields a plus sign with a question mark for WP. This result comes from the simulations, see note 5 and 6.

CONCLUSIONS

Loop analysis was successfully applied to different ecological systems (Ortiz and Wolff 2002, Bodini et al. 2007, Martone et al. 2017, Bodini et al. 2017, Rocchi 2017) and recently proposed also for the study of serial products within the paradigm of narrative ecosystems (Pescatore and Rocchi 2018). Through the preliminary investigation of the narrative ecosystem of *Game of Thrones*, we have experienced a first application of the loop analysis methodology, taking into account heterogeneous variables. Through a broader investigation of the presented case study and of other cases, this methodology would allow to investigate the complex relationships existing between heterogeneous variables (narrative, productive, consumption, etc.) and to evaluate the propagation of direct and indirect effects following both internal and external perturbations and constraints, that act on one or more variables of the system. Therefore, an innovative methodology for media studies was proposed, which, based on the knowledge deriving from traditional studies, is able to systematically grasp potentially interesting aspects and that can be further investigated (for example, in the case study regarding *Game of Thrones*, there emerged the need to analyze more in depth the relationships established between war plot and fantasy plot). In this perspective, we hope that thanks to further studies, through the use of modeling tools, it will be possible to describe a serial product in its complexity, by investigating, delineating and hypothesizing, both at the level of the single product and of the trends related to the media context, the functioning and response in relation (I) to narrative changes, (II) to reception and consumption practices and (III) to the production and distribution strategies of the media industry. This approach could allow the identification of emerging trends and patterns, both within the individual cases analysed and in the context of the contemporary media industry.

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