

Interactive drama on computer : beyond linear narrative

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Abstract

This study aims to design a new kind of interactive drama, where the user interacts in depth with the course of the narrative, while the dramatic intensity is retained. Based on various theoretical sources on narrative and drama, a model is put forward. This model is used to build a computer system of interactive drama.

Introduction

Definitions

For the clarity and accuracy of this study, we would like to give some definitions of the terms that will be used throughout this study.

By *narrative*, we mean a certain type of artistic and social expression, where a kind of imitation of real events is involved (Genette 1969). Narrative is quite a broad concept (see Adam, 1994 for a precise and detailed definition), which, in this study, will cover various forms like tale, novel, theatre, movie, video games, etc.

The *story*, which is easily confused with the idea of narrative, will refer to the succession of actions that happen in the world represented by the narrative. The story "lives by itself", including actions that are not explicitly told, while the narrative is only what is told, and implies the notion of an explicit or implicit narrator.

By *drama*, we mean a special kind of narrative, where the actions are directly represented to the spectator. A novel is not a drama, because it involves the written language, which is an indirect representation (the arbitrary nature of the linguistic sign). A play, a Movie are drama, as well as a video games. Note that drama is not necessary visual: radio plays are kinds of drama.

At last, let's precise the notion of *interactivity*. *Interactive drama* refers to this specific kind of drama where the audience can modify the course of actions in the drama,

thus having an active role. However, this does not mean that the reader of a novel, the member of audience in theatre are passive: they are quite active, but this activity remains internal.

Overview of interactive drama

We lack space and time to give here and now an exhaustive overview of all forms of interactive drama. However, We claim that current forms of interactive drama are limited. Indeed, three mechanisms are mostly used for constructing interactive drama:

- branching: the user is faced to a choice in the action, and the narrative is different according to user's choices (adventure games, interactive fictions, interactive movies). The problem of this approach is that all the possible paths must be carefully designed by the author; thus, only a small branching factor can be used, because otherwise, the work of the author would be huge.
- superposed interactivity: during a global linear path into the narrative, a localized interactive scene occurs; it can be a puzzle, a fight in a game, etc. Although very interactive (many actions are allowed), this interactivity constitutes a superposed layer to the narrative itself: only the issue of the interactive session modifies the course of events.
- simulations: video games involving an environmental simulation (Simcity like games, real-time strategy games) are deeply interactive, in the sense that some actions can have a real consequence on the course of events. However, the succession of events that emerges from the interaction is not really a story: some fundamental elements of drama that will be detailed below are missing: conflict, transformation, etc.

Current interactive drama, in particular video games, use one or several of these three mechanisms to provide enjoyable pieces, but from a dramatic point of view, the interactivity tends to weaken the plot, reduce the suspense, compare to, for example, a movie.

Goal of this study

This study aims to go beyond this kind of interactivity, to reach a new kind of interactive drama, which will gather the two following conditions:

- the user is able to act in depth on the online generated story: his or her actions modify the course of actions in several ways, giving him or her the impression to be a free agent in the drama, not just following a predefined path;
- the fundamental principles of drama are respected, in order to guarantee strong emotional involvement and identification during the interaction.

In a way, those two conditions are conflicting: traditionally, the principles of drama are respected when the author completely controls the play or the script; so, if the user influences the course of actions, and because the user is not an author (he does not know anything about drama), his or her intervention may destroy the dramatic experience. Here is the challenge of interactive drama, and this paper will try to show that it is possible to maintain the will of the author while allowing the user to deeply interact with the play.

In the short term, we intend to build one example of such interactive drama, play with it, and understand how the user behaves when faced with it.

In the long term, a real authoring system will allow an author to build his or her own interactive drama.

The obvious application of this work is digital entertainment. If most current video games are basic, sometimes only requiring reflex behaviors, its audience is now widening to older and not only male people, who appreciate some more artistic and dramatic interactive experience.

As will be shown below, this goal will lead us to more precisely understand some principles of drama, whose modeling is also interesting as itself, in a pure theoretical aim.

Method

In the next section, some theoretical theories related to narrative and drama are shortly exposed. Only the studies which appeared useful to build the model are presented. And for each study, the key concept is highlighted.

Then, a model is proposed, which relies on the theories on drama and narrative.

The model does not intend to be a model of narrative in general, neither are we introducing some narrative concepts just for supporting a model. The model is just *stemming from* the narrative concepts.

At last, the model is discussed from various point of view. Obviously, experimental results will follow in the near future, but they were not advanced enough to be stated here.

Theoretical grounding

Intelligent characters versus narrative functions

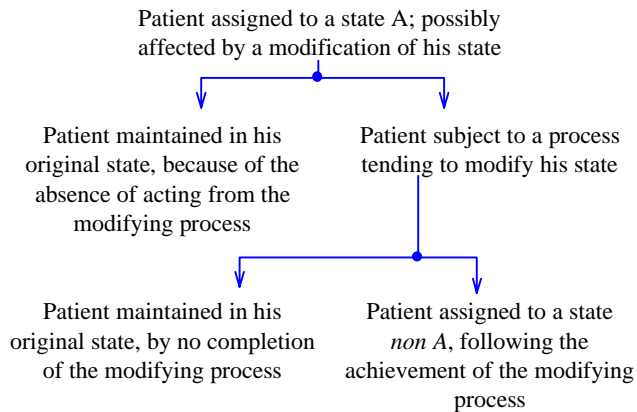
Seventy years ago, Vladimir Propp analyzed one hundred russian tales, and constructed a canonical form of the tale, based on 31 successive *functions*: “absence”, “interdiction” “transgression”, etc. (Propp 1928). Beyond the fact that this precursory work already constitutes a model of narrative, that is the notion of function itself that is determinant for interactive drama: a function is a character action *defined from the intrigue viewpoint*. This apparently simple idea means that the choice to put or not put a given function inside a story is not governed by the causality of the story (a character does something because some events occurred) but by the causality of the whole narrative, i.e. the character does something because it is necessary for the plot. For example, “The Hero leaves home” (function 10) is not only caused by the “wrongdoing of the wicked” (function 8) but because it is necessary for the development of the narrative (the narratives must be a journey, with several obstacles, etc.).

Propp’s notion of function gives an interesting light on the current trend in intelligent characters: it is not necessary, or at least not enough, to put AI in characters (Blumberg 1997) for interactive drama, because those characters are strongly influence by the narrative: they should not only decide by themselves, but according to the narrative. They are accomplishing Propp’s functions, rather than psychologically motivated actions. Thus, the right place of AI in interactive drama is not in character, but in narrator. As stated by Aristotle, the characters only need to be plausible. In a practical approach, AI can be used at both levels (characters and narration), but the designer must always be very careful not to waste time to put intelligence in a character, if the decision to act is a matter for narrative.

Principle 1: character’s actions are motivated by narrative constraints rather than emotional, psychological, or social reasoning.

Story generation

Claude Bremond (Bremond 1974) extended the Propp’s study on functions, by proposing a richer and more precise model of stories. His goal is surprisingly close to our own: he tries to answer to the following question: “is it possible to describe the complete network of choices that are logically given to a narrator, at any point of his narrative, to continue the started story?” (Bremond 1974, p. 8). Indeed, Bremond breaks down a story into a succession of *processes*, each process being centered on an task and divided into three steps: possibility, acting and completion. Here is an example (Bremond 1974, P. 141) of the process of modification, applied to a “patient” (as opposed to “agent”):



Dozens of different such processes are given in (Bremond 1974). But our goal is not to integrate those in a model, which would be far too much complex, but to keep the very idea of a process, divided into three parts.

Principle 2: a story can be broken down into a succession of generic processes.

The conflict

The notion of conflict is often described as the main mechanism of drama (Jenn 1991, Lavandier 1997, Parent-Altier, 1997). Generally speaking, a conflict occurs when a possible action for a character is not compatible with his/her values: a solitary boy must conquer a girl, an aristocratic lady cannot tell her love to a poor servant, etc. The reader could refer to any scriptwriting textbook, to find examples of how plays and movies are centered around one main conflict. The classical structure of a play (three acts) can be seen as a consequence of the wish to exhibit a conflict: the first act is aimed to state the situation, the characters, and especially the values of the hero. Then occurs the event which will trigger the action itself, forcing the hero to do something; all the second act will develop the conflict, showing how the hero have to act but cannot act towards his or her values. Then, a irreversible choice is made by the hero, which will lead to the final act. This irreversible choice can be understood as the way to solve the conflict: in tragedy, the conflict is “winning”, no satisfying solution is found, and often the hero commits suicide or gives up his goal (tragedy); in comedy, a happy resolution is found, often through what is called a *deus ex machina*. If the conflict is most important in drama, it is certainly because it allows the audience to identify with the hero, because the real life is full of conflicts (Jenn 1991).

So we claim, even if it is a simplifying assumption, that the notion of conflict is primary. One could consider a more sequential description of narrative, like the 31 functions of Propp, the three acts of a play, the twelve steps of Campbell’s model (Campbell 1968 in Vogler 1998), but the conflict seems to be above all these descriptions.

Note that the approach in (Sgouros 1997) also takes the conflict as the key element for making interactive drama.

Principle 3: the conflict is the core of dramatic narrative.

The Pragmatics of narrative

If the researchers in structuralist narratology like C. Bremond have largely improved our understanding of narrative, they tended to consider the narrative as an autonomous entity, while a narrative suppose a narrator and an audience (Adam 1994). The situation is similar to a dialog, where a speaker performs an utterance to a hearer, in order to convey a message. The narrative is designed *towards* someone, even if this receiver is not as close to the emitter than in a oral dialog. This approach is a matter for Pragmatics, because the narrative is considered as a medium to act upon someone. How is this influence “coded” inside the narrative? Sometimes explicitly, for example in the french La Fontaine’s fables: “Le lièvre et la tortue” (the hare and the turtle) includes the sentence “rien ne sert de courir il faut partir à point” which means that it is better to start on time than to run. But usually, the message is contained in the story itself: any narrative contains a transformation from an initial state to the final state, as already stated by V. Propp. We are considering that this transformation is the result of how the conflict has been solved, and the very message of a narrative is to demonstrate that it is not possible to have a given goal because a given value is important, or that, conversely, a given value is bad, and necessarily leads to a failure. There is much more to investigate to understand the links between the structure of the narrative and the precise message that is conveyed, but as a first approximation, we will consider the following:

Principle 4: any narrative assumes an intention of the author towards the user; this intention is supposed to lie in the conflict itself, and how it is solved.

The user model

When an author writes a novel, a scriptwriter a screen play, he or she imagines the audience or the reader, and writes his narrative according to what he or she supposes his audience or reader to be. As described in (Eco 1979), a narrative does not contain the complete information describing the story: on the contrary, it mostly contains unsaid things, and the reader is in charge of reconstructing the story from the pieces he is given. Otherwise, reading would be infinitely boring. By just giving a partial information, the author must presuppose how the reader will be able to reconstruct the meaning; by doing so, he needs what U. Eco calls a *reader model*. It is straightforward to extend the term to “user model”, well known in Human Computer Interaction. Movie makers are also familiar with this, when they use the technique of ellipsis, which consist to letting the audience guess what is happening (out of shot, between scenes) instead of showing it (Durand 1993).

Although these forms of narrative are called “non interactive”, they are designed so that the audience remains constantly active, guessing what is not said from what is said.

Principle 5: for any narrative, the author is implicitly using a user model to manage the user reaction to its narrative.

The Model

General architecture

The model is a computer model for interactive drama: after being parameterized by a writer, the user will interact with the computer to build a story each time different, depending on his or her actions.

The general architecture of the model comprises the following components (see figure below):

The world of the story: it contains the state of the world as it is currently described by the story. In an AI language, this is typically a base of facts. This world is initialized before the start of the narrative, according to the specifications of the author. Its temporal evolution is the story.

The narrative logic: it contains rules on how the world of the story can evolve. Typically, it will not give the next action, but a set of action that are possible. Here are coded many generic rules coming from narrative theory.

The narrator: it decides which action(s) should be proposed to the user, filtering what is suggested by the narrative logic. Some of those actions are to be just executed, other are proposed to the user in a form of choice list, as in traditional adventure games. The narrator also "listen" to what the user does, to modify the world of the story and decide to tell something (an action).

The user model: it is used by the narrator to choose the action according to its belief on user. This model contains two kinds of variables: user features, which could be adapted to each user, but which will remain static (at least in first implementations) and dynamic variables, which are updated after each action.

The theatre: it manages the interaction with the user: display of actions, and capture of user actions. All the graphics are located in this part: in a 3D Real-Time system, it would for example load the 3D components, choose the camera angles, etc.

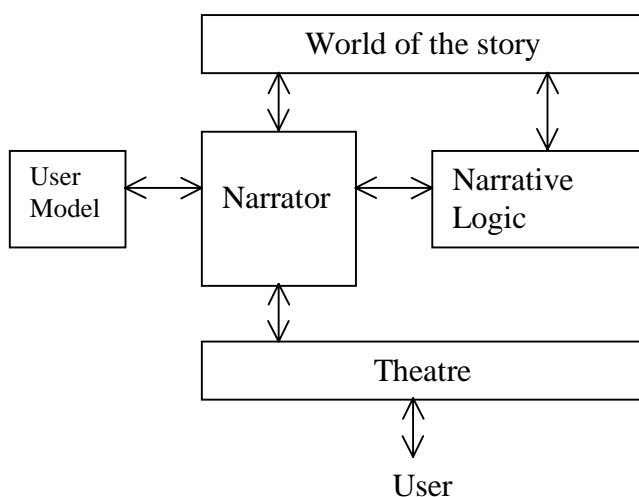


Fig. 1: The architecture

Each of those components correspond on object, in an object oriented system. This means that, ideally, component can be exchanged easily.

Despite the apparent generality of this architecture it presupposes some assumptions:

- the user interacts by choosing an actions among several; this is a classical type of interaction, whose advantage is that it can be compared to already existing interactive drama. Furthermore it appeared to be the easiest way to interact with the story;
- the display is separate from the story construction: an action is decided and *then*, it is displayed. This choice is mostly motivated by the search for simplicity.

The story engine

This is the core of the model.

Following the principle 3 described above, the model focuses on putting on stage a conflict. A narrative needs a protagonist, and possibly more characters. The protagonist (other characters can be simpler) contains the four following basic units:

- A goal: the practical state the character wants to reach.;
- An obstacle: a practical element in the world of the story which makes impossible the task that directly leads to the goal;
- Overstepping tasks: alternative tasks that the character must accomplish to reach the goal;
- Values: psychological (and social) features according to which tasks are evaluated (positively or negatively).

The protagonist seeks to reach its goal, but he meets an obstacle, which force the character to find an overstepping task.

The conflict occurs precisely when the overstepping task is badly evaluated according to the character values. Thus, the character is torn between his need to reach the goal and his values.

Around this conflict, the drama is organized into three successive parts:

- before: the character hears the possibility of the overstepping tasks, is influenced, hesitates, decides or refuses;
- during: the character performs the tasks, which can need several actions, some can succeed, other fail, etc;
- after: the consequences of the overstepping task are drawn.

If the overstepping task has succeed, this is the end of the narrative, which falls into the two following cases:

- either the overstepping of a value is accepted by the protagonist, who is consequently changing; this type of ending is more typical to the comedy;
- either the same overstepping task is rejected, and the protagonist is completely broken, which can leads to various tragic ending (suicides, etc.).

Here lies the intention of the author(s): showing that a

given value is “bad”, or that, conversely, it cannot be violated.

Given the general overview of the generated story, let us present how the various actions are followed one from each other.

Let us define *X* the protagonist and *a* the overstepping task. Many different actions are able to be induced by the overstepping task, implying the character *X* and possibly other characters *Y*, *Z*. Inspired by Propp’s functions (Propp 1928), Bremond’s processes (Bremond, 1974), Todorov’s narrative transformations (Todorov, 1970), we propose the following actions:

Information	Inform(<i>X</i> , <i>Y</i> , PREDICAT)	<i>X</i> informs <i>Y</i> that ... ANY PREDICAT
Influences	Incite(<i>Y</i> , <i>X</i> , <i>a</i>)	<i>Y</i> incites <i>X</i> to perform <i>a</i>
	Dissuade(<i>Y</i> , <i>X</i> , <i>a</i>)	<i>Y</i> dissuades <i>X</i> to perform <i>a</i>
Decisions	Accept(<i>X</i> , <i>a</i>)	<i>X</i> accepts to perform <i>a</i>
	Refuse(<i>X</i> , <i>a</i>)	<i>X</i> refuses to perform <i>a</i>
Acts	Perform(<i>X</i> , <i>a</i>)	<i>X</i> performs <i>a</i>
	Obstruct(<i>Y</i> , <i>a</i>)	<i>Y</i> obstructs <i>a</i>
Consequences	Transform(<i>X</i> , <i>a</i>)	<i>X</i> changes the value(s) which was(were) blocking
	Break(<i>Y</i> , <i>X</i> , <i>a</i>)	<i>Y</i> breaks with <i>X</i> , because of a value of <i>Y</i> violated by <i>a</i>

Note that the last action can exist for *X*=*Y*, which means that *X* breaks with himself, which leads to an impossibility to live normally.

This set of actions is considered to be rather general, because it stems from narrative theorists who studied a large amount of narratives. However, this is not totally rigid: for a certain kind of story, the author may need additional actions, or not need some of the above. For example, it is possible to add more actions into the decisions group, for representing a more gradual process of decision making. The acts group can also be much more detailed, for representing tasks and subtasks, success and failure.

Each of those actions, when applied, causes a modification of the state of the characters involved in the action. This state is represented by another set of predicates:

CAN(<i>X</i> , <i>a</i>)	<i>X</i> is able to perform <i>a</i>
KNOW(<i>X</i> , PREDICAT)	<i>X</i> knows any predicat
WANT(<i>X</i> , <i>a</i>)	<i>X</i> wants to perform <i>a</i>

HAVE_BEGUN(<i>X</i> , <i>a</i>)	<i>X</i> has succeeded to perform <i>a</i>
HAVE_FINISH ED(<i>X</i> , <i>a</i>)	<i>X</i> has succeeded in performing <i>a</i>

The actions themselves are performed by rules, each of them containing a set of preconditions and an action. For example, one rule is:

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IF
  CAN(X,a)
  ~KNOW(X,CAN(X,a))
  KNOW(Y,CAN(X,a))
  ~IS_FORBIDEN(Y,a)
THEN
  Inform(Y,X,CAN(X,a))
  
```

which means that if a character *X* is able to perform a task *a*, does not know it can do so, but *Y* knows it, and if this task *a* is not forbidden by *Y*’s values, then *Y* can inform *X* about the possibility to perform *a*.

Note that the introduction of the state “ IS_FORBIDEN”, evaluated according to character’s values.

It is very important to understand that those rules, which are part of the narrative logic module described above, are not triggered in the same way than for classical rule based systems: all the rules whose precondition are true are retrieved but not fired (the post-conditions are not applied), and transmitted to the narrator. It is the narrator and then the user who triggers the rule, and calculate the consequence.

The virtual narrator

The narrator has to choose between all possible actions proposed by the narrative logic. For this, it uses the user model, which contain information about the psychological state of the user. The approach is similar to the work of (Senger 1998), where the psychological and emotional impact on the user is taken into account to structure action.

In the short term, we will mostly try to manage user tension, avoiding to concentrate all strong actions on the same short period of time for example. This implies to mark all actions according to their dramatic intensity.

Later, a more sophisticated model will be used, managing precisely what the user knows and ignore; by this way, the suspense for example could be finely tuned.

Visual display

In the first version of the system, the display will be minimalist: only the textual description of actions will be shown. One of the reason why we choose this basic solution, is that choosing a way of representing action is both determining and dangerous. Indeed, this would be quite naïve to try to reproduce the current movie techniques, as many current video games try to do: first, realistic visualization, although improving very fast, is still very limited in case of interactive systems; second,

modeling all the movie making process, centering in particular, is a huge amount of work; third, and most importantly, we should avoid to reproduce idiotically what works for one kind of art to another. Multimedia art is just at its beginning, and there is a long way to go before one understands how it works.

Beyond the precise technique of visualization, there are many ways to represent an action: one can represent the course of the action itself, but also its consequence, which sometime is much more efficient (Durand 1993). It can also be chosen not to represent it at all, using the ellipsis process to enforce the dramatic intensity.

The role of the user

Given the above architecture, there are several ways to let the user intervene on the narrative. In particular, the three following questions should be answered:

- Should the user control one character or many?
- Should the user totally control at least one character?
- Could the user be ubiquitous, being able to see various places at the same time in the story?

It is not suitable to answer those questions straightforward: we need to understand at a higher level the role of the user. According to the pragmatic approach of narrative (see principle 4 above), traditional narrative is like a dialog, with the difference that the hearer can not answer immediately. In interactive drama, the user is able to answer. Thus, the most suitable interaction scheme for interactive drama is the argumentative dialog, where the author, through the parameterization of the program, and the user discuss one with the other. The user wants to have his or her hero reach the assigned goal, while the author wants to show, through a conflict, that some tasks are good or bad. In this "fight" between the author and the user, which is transposed inside the story, the user should not be able to control actions of all characters, otherwise that would be too easy for him and boring; it would be like playing chess against oneself: it is not interesting because one has too much control over the opposite forces. Thus, we push to follow the constraint that the user only controls one character, the protagonist. There may be a trick to alleviate this constraint: the user, in a gaming context, could be given, at the beginning, a certain number of points; controlling the protagonist would cost no point; controlling some friends could cost a few points, while controlling the opponent would cost a lot of points. By this way, the control by user of other forces in the world of the story would be allowed but limited.

A problem remains: the author assigns values to a protagonist, and this protagonist is then controlled by the user, who may have different values: the user could force the protagonist to act against nature. One solution is to adapt the character to the user through learning mechanisms, so that the protagonist become similar to the user. Although attractive, this solution remains difficult to settle; it will be discarded in the short term. The second solution consists in giving more autonomy to the character

(Portugal 1999). The way to balance the autonomy and the control is however quite problematic, and no solution is currently known to that problem. The third solution consists in letting the user control its protagonist, while the narrator use other stratagems to convey the author's intention. For example, if the user decides too soon to perform an overstepping task, the narrator will naturally insert actions where sympathetic characters strongly dissuade the protagonist to perform the task. Obviously, such an approach needs experimentation and tuning.

At last, if a given script allows navigating inside several physical places, it seems reasonable to allow in certain conditions the user to have a look on distant places. This seems not necessary, but may reproduce a fundamental principle in movies: the audience often know more than the protagonist.

Conclusion

The technical point of view

This paper reports a work in progress: the architecture is currently being implemented in java. The first version of the system is necessary to test the validity of the assumptions, in terms of user experience, or "gameplay", as gamers use to say.

Once a first version is implemented, almost all its parts could be updated to more sophisticated solutions. In particular, the story engine now uses a very basic logic, in a pure forward approach. Because a classical narrative is often designed by an author by starting from the end, it seems interesting to use the rules in backward: which rules should be triggered now if I want the story to pass this stage?

The author point of view

By analyzing, dissecting and then artificially re-synthesizing the narrative, our approach may seem to denature the creative process of the writer. In fact, the writer creativity is just shifted from a sequential writing to the underlying forces producing the narrative. This is not really new for a good scriptwriter: in the writing process, he or she first thinks of a general theme, then builds the main characters, designs the conflicts and only at last constructs a linear succession of scenes. This is only this last stage which is not necessary in the creation of a script for an interactive drama. The author will have to first design the conflicts he or she wants to exhibit, choose which one will be the main conflict, then define characters and their values.

This process is still to be experienced, progressively refined and then, may be, systematized and formalized: it took years to define the process of making a script for a movie, and only part of the method is transposable to interactive drama writing.

The user point of view

How the user is going to feel while interacting with a drama? We are expecting to combine the phenomenon of identification with the protagonist especially found in the classical drama and the feeling of immersion/involvement proper to the interactive experience in video games.

This is not obvious that this combination is feasible, because the identification effect might be wiped by the possibility of interaction, while the involvement in games might disappear as soon as no reflex action is involved (notice that adventure games are often less involving than pure action games...).

But here lies the challenge, and one has to explore this new form of art that computer is offering. Should we realize that this art is vain, it would also be a worth contribution.

The narrative point of view

The model of drama proposed in this paper is a means to build an interactive drama system. However, is this modeling process worth as itself? Will this model help us to better understand what is a drama?

We believe that the answer is positive. For example, the notion of conflict is often fuzzy and ambiguous. In the model above, the conflict is a very clear concept: the situation where an overstepping task is negatively evaluated according to a character's values. Similarly, the clear distinction between the mechanisms that provide all possible stories (world of the story + narrative logic) and those responsible of the narration itself (narrator + user model + theatre) is valuable to understand the different components of a drama.

As for other disciplines, the effort of modeling, although often reducing and simplifying, help clarifying and understanding concepts.

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