

Dramatic Level Analysis for Interactive Narrative

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Abstract

In interactive 3D narratives, a user's narrative emerges through interactions with the system and embodied agencies (characters) mediated through the 3D environment. We present a methodology that identifies and measures four factors in interactive narrative where agency is present. We describe a technique for measuring drama, agency and engagement and compare the centrality of a designed interactive narrative with the emergent participatory narrative. This methodology has application as an analytic device for any interactive narrative where agency is fundamental. The adoption of the FrameNet semantic resource and the interpretation of interaction in narrative, situate this work in the domain of 3D interactive narratives, mixed and augmented realities and polymorphic narratives that cross forms of media.

1 Introduction

One of the reasons that narrative is difficult in 3D environments is the seemingly inherent contradiction between authorship and participation coined the *narrative paradox* by (Louchart & Aylett, 2004). A participant in a 3D environment invariably has far more agency that manifests as control over character actions, than is possible in other mediums such as film or literature. Although the reader of a novel is far from passive, he or she cannot alter the course of events prescribed. In contrast, participants in 3D environments can readily perform interactions that often do not advance the narrative, are loosely connected or even disruptive to the narrative flow.

Although drama is accepted as intimately associated with narrative, prevailing dramatic theories regard drama to be an abstraction emanating from an entire narrative sequence. For Aristotle, (c. 335 BC) drama is a type of narrative that contains structural elements such as plot, theme, character, dialogue, rhythm and spectacle. For instance, the plot is the overarching structured narrative as having a beginning, middle and end, containing the concern or matter in question, demonstrating a dramatic peak, reversals of fortune and the resolution or catharsis of the concern. Dramatic theorists (Freytag, 1863), (Mateas, 2000), (Hiltunen, 2002) expand upon the Aristotelian view though still associate drama with the entire narrative. Figure 1a represents the perspective that parts of the narrative such as the Hero's Journey by (Campbell, 1993) (N in Figure 1a) combines with dramatic structure (DS) to lead to engagement (E).

An alternate perspective, illustrated in Figure 1b regards engagement to be due to the drama inherent at each moment (DM) in addition to the capacity for user agency (A). The influence of the authored narrative on engagement is reduced (dotted line in Figure 1b). This view that the dramatic value at each moment is influential is consistent with the double appraisal affective approach advanced by (Louchart & Aylett, 2007). Test audiences rated stories as more dramatic when agents were driven by assessments of their own, and other character's emotional states at each event throughout a sequence.

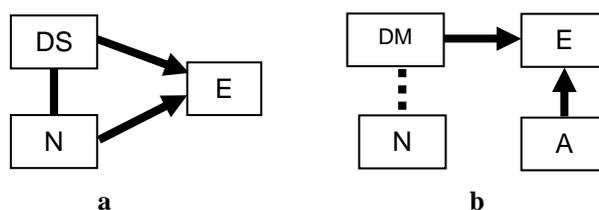


Figure 1: Dramatic Structure to Dramatic Moments

Viewing drama as manifesting at each moment enables the identification of a level of drama ranging from non-dramatic to extremely dramatic, as a factor for each event in a sequence. The compelling element that defines an event for the purposes of dramatic assessment is taken to be an *interaction*. A linguistic approach is taken to define interactions or ‘acts of doing’ by verbs. This approach to 3D interactivity has been introduced by (Crawford, 2005) who defined sets of verbs as actions that 3D game characters can execute.

The interpretation of single verbs used as labels for interaction sequences can be quite subjective. Ideally, a semantic resource for interaction should be found that relates interactions to others in agreed upon ways to constrain the subjectivity and introduce a degree of standardization. A linguistic framework, the Berkeley FrameNet Project (2006) that performs the role does exist. This is an on-line lexical resource for English based on frame semantics. The project and its application to this study as a semantic resource for interactions is described further in Section 4 where we describe *Dramatic Value*.

Since most people are drawn into the drama of narrative or stories, it is reasonable to expect that most people will agree on the level of drama inherent in a single interaction. An *attack* interaction will be universally regarded by most people to be highly dramatic. A *sleep* interaction will be largely thought to be quite undramatic. Drama is not as directly connected to the narrative as dramatic theorists would claim but derives perhaps more directly by association with moments in the human experience. This is not to claim that the specific context of an interaction has no impact on its dramatic level; a *sleep* while perched precariously at height can be imagined to be highly dramatic. Rather, a level of drama can be conceivably associated by default with each type of interaction.

The hypothesis that most people agree about the dramatic level inherent in a particular interaction has not previously been studied. Results from a study using an online survey confirm this hypothesis and are presented in Section 5.

A dramatic flow for an entire narrative sequence can be generated by plotting the dramatic level for each interaction throughout a sequence. Conversely, tracing an existing narrative created from a user’s interaction with a narrative 3D environment (participatory narrative), can be analysed with regard to the level of drama for each user interaction. This generates a framework from which factors such as the level of the user engagement and the centrality of the authored narrative can be measured.

In this paper we describe agency as reducing the centrality of the structured drama. This does not mean the structured drama is less important. Put simply, narrative becomes *meta-narrative*. It is less important for the dramatic moment since agency replaces this, but none-the-less crucial for the narrative experience. We advance a new approach that identifies engagement as a derivation of narrative and drama somewhat independently. The measure of the dramatic level, the measure of agency and the centrality of the designed narrative of each sequential interaction can therefore describe a 3D experience. We call this the Interactive Narrative Framework. Interaction and engagement are central concepts and are discussed in Sections 2 and 3. Following that, dramatic level is presented along with a survey that indicates some universality in perception of dramatic level for sample interactions. The use of the Interactive Narrative Framework for the analysis of user experience with a 3D environment is presented in Section 6 prior to concluding remarks.

2 Interaction

(Calleja, 2007) describes interaction in 3D games as the user’s ‘acts of doing’. These acts of doing according to (Bjork & Holopainen, 2005) are *Freedom of Choice* and *Illusion of Influence* patterns. They either validate, or give an illusion, that the user’s acts have some meaning or effect on the progression or conclusion of a 3D narrative.

The methodological framework we present emphasizes interaction as the means to measure and structure the drama and facilitate the identification of user patterns of engagement. Each interaction is tagged with a numerical value representing its level of drama; this value can be used as a comparison point for other

factors such as the user's engagement in the narrative or the user's level of agency. For example, an *Ambush* interaction is quite dramatic and is tagged with a high dramatic value; an *Attach* interaction is not dramatic, but may involve a dramatic agent *Murderer* or a non-dramatic object *Paper*.

Interaction is not simple. (Jensen, 2001) describes it as so complex that its meaning depends on the context, but (Elam, 2006) writes that interaction involves two or more entities; *agency* and an *affected entity* that may, or may not have agency. The 'acts of doing', or actions of the agent are crucial structuring principles that involve some intention or purpose. Indeed, in the framework we present, the agent of an interaction is both cognitive and has agency (is agentative) since it is typically the User who makes decisions that are enacted by the Avatar. Acts of doing or interactions are conceptualized by a set of defining constraints that link to the affected entity that may be a simple object without agency or cognition, or cognitive and/or agentative.

Fight for example, is a *compound* interaction and more complex than a *basic* interaction that (Elam, 2006) describes as a 'mere doing' that might be the simple raising of an arm or taking a step forward. Basic interactions combine to form a *compound* or *higher order* interaction, such as participating in a fight or powering up a magic spell. The basic interactions contained within a compound interaction can be significant to the narrative alone but more typically when grouped in a meaningful way as in a compound interaction.

The two constructs we have identified as crucial for understanding interaction and 3D narratives are *engagement*, the level of user involvement in an interactive narrative, and *agency*, the means by which a user is able to interact. Engagement and agency are discussed in the next section.

3 Engagement

From a dramatic perspective as (Mateas, 2000) writes, agency is the most fundamental category in interactive narrative and engagement implicit in the Aristotelian dramatic model, since engagement is necessary for an audience to experience catharsis. The resolution of the concern, complication or matter in question can only occur if the user is already connected or engaged in the concern or matter in question. If the designed narrative does not engage the user, then its conclusion is unlikely to feature in the formulation of the participatory narrative, or the *story* of the user experience of the designed narrative. Mateas adds that agency is central for user engagement in interactive narratives, and the disruption of agency disrupts engagement. Furthermore, the degree of agency affects the degree of engagement. In a *Cut Scene* for example, where a short video describes some aspect of the designed narrative, the user has no agency, and engagement is typically lost. In Calleja's (2007), study, only 2 participants stated they gave any importance to prestructured narrative. The majority of participants skip quest descriptions to get to the interactive functionality where some level of agency is possible.

Agency fosters the feeling of engagement that comes from being able to take some action, or interact in the 3D world with an effect that in some way relates to the user's intention or will. At the very least, according to (Bjork & Holopainen, 2005), the effect of an interaction must give the *illusion* of affecting the narrative for it to be engaging.

It is unlikely that users will engage in any given designed or pre-authored 3D narrative in its entirety since, if they cannot exercise some form of agency or make decisions that affect the drama and direction of their own narrative experience - quite simply, they will stop participating.

The analytic methodology we present facilitates the *measure* of a participant's engagement, the levels of agency and drama in an interaction and the impact of the designed narrative through the Interaction Framework we describe in this paper. Since interactivity is core to involvement and engagement, and agency is embedded in a user's acts of doing, it is feasible to plot the course of a participant's narrative, interaction by interaction. This generates a structured framework from which the dramatic signature or flow of drama within any sequence of interactions can be drawn. When applied to a scenario or a meaningful collection of interactions, factors such as the dramatic signature for type, or pattern of

interactive narrative parts, indeed for an entire interactive narrative is unveiled. From this, it is possible to log a participant's level of involvement or engagement across any game element type and narrative pattern.

4 Dramatic Value

The segmentation of actions into units, as (Damiano, Lombardo, & Pizzo, 2005) write is a well known convention that dates back at least as far as Aristotle, (c. 335 BC) and has been formalized in semiotic studies such as (Elam, 2006), in order to mark the discrete progression of the narrative.

Although the dramatic flow arc is well documented by most authors that discuss drama, other than (Damiano et al., 2005), it is difficult to find any work that defines a dramatic level or variable for computing the level of drama at a given point in an interactive narrative.

In this study we use tripartite compound interactions; (a) the agent noun, (b) the interaction verb and (c) the affected noun(s). Designating the user as agent, enables the tracing of the users interactive experience even when the users' acts of doing are not those proscribed within the narrative design. From a single perspective followed through the parts of an interactive narrative, data such as the level of user agency, engagement and drama, as well as the degree to which the designed narrative has impact on the moments of doing, can be assessed.

The formalization of compound interactions using the method we advance requires both *verb* and *noun* thinking. For example the interactions *repel wolf* or *modify avatar* are comprised of a verb and a noun, and enacted by the user. All verbs and nouns in essence have some level of drama, even if this level is zero.

Preliminary results from a study using an online survey seem to confirm the hypothesis that most people agree about how dramatic a particular verb, phrase or noun is. In the study, participants were asked to indicate the dramatic value on a scale from 0 - 3 associated with a set of verbs, phrases and nouns. Value 0 indicates a *Not dramatic* response. The remaining values 1, 2, 3 respectively indicate increasing levels of drama; *A bit dramatic, Dramatic* and *Very dramatic*.

5 Dramatic Value Survey

The anonymous online survey was constructed (Macfadyen, Stranieri, & Yearwood, 2007), with 88 respondents drawn from a cross section of University staff and students. The results indicate that respondents *do* agree on the level of drama of a given word or phrase.

Each respondent was presented with 38 single word nouns such as *the air, the death, the lute, the quest, the viper, the train* and 39 single word verbs such as *to perceive, to reveal, to struggle, and to devour*. Respondents were also presented with 20 phrases including *He looked back, He is dragged into the blood-stained room, She attempts to conceal herself but is discovered, All who hear him sing are entranced, On her wedding day she is slain by a viper*. The verbs, nouns and phrases were randomly drawn from texts of sample myths.

Of the 8,439 responses within the pilot group, a significant level of agreement (as determined with a Chi Squared test with $p < 0.001$) about the level of drama on the four point scale for verbs, phrases and nouns was noted for all but two variables. From 39 verb variables tested, only two variables *To Love* and *To Marry* did not indicate a significant level of agreement about level of drama (Chi statistic (Love) = X, $p > 0.05$; Chi statistic (Marry) = X, $p > 0.05$). Of 20 phrase variables and 38 noun variables, all results indicated significant agreement, and no variable was unproved. More data is needed to determine differences, if any, in both gender and proficiency with the English language.

The advantages of calculating a level of drama at any plotted interaction point, is that in a given narrative or scenario, any single chosen point of view can be measured against it and the dramatic arc flow signature for any scenario is revealed. For interactive 3D narratives, this is crucial, since the user's

narrative experience frequently does not match the designed or authored narrative expectations, and further, must include user/system interactions that are usually omitted in the design plan of interactive 3D narratives.

It is important to make the distinction between a thing that is essentially dramatic, like the verb *To Menace*, and the *dramatization* of a thing that, for example is essentially undramatic such as the noun *Sparrow*. The verb *To Menace* is very dramatic and cannot be made less dramatic. The overall dramatic level of a compound interaction where a *Menacing* act occurs can be modified to be *more dramatic but not less* by the inclusion of objects (nouns) that alter the dramatic sum for the interaction.

The dramatic sum for an interaction is the total of the dramatic values for the agent/noun, interaction/verb and object/noun.

Table 1: Dramatic Values

User/Agent	Verb	Value	Noun	Value	Total
User	menaces	3	a sparrow	0	3
User	speaks to	0	the Cyclops	3	3
User	speaks to	0	the shepherds	1	1
User	menaces	3	the shepherds	1	4

Table 1 illustrates how the User who menaces the shepherds has a greater dramatic sum than speaking to the Cyclops. The *Shepherds* and the *Cyclops* have dramatic values of 3, but *menacing* is more dramatic than *speaking*.

6 Interaction analysis

The user in a 3D environment experiences three types of interactions; those between non-player characters and elements within the 3D environment, those between the user's avatar and 3D environment elements and those between the user and the computer system. If engagement in interactive 3D environments does not derive from the narrative, it may derive from the dramatic flow of the three types of interactions the user experiences when engaged in a 3D environment.

The task of measuring user engagement at each dramatic point is challenging, however the preliminary analyses reveal clear patterns of engagement and disengagement in relation to the types of narrative and interactive structures in the sample single user computer game *The Elder Scrolls IV - Oblivion* (Bethesda Softworks, 2006). Using the Interactive Narrative Framework (IFN) advanced here, as an analytic tool, we are able to define an orthogonal perspective shown in Figure 2 that suggests that strong dramatic levels combined with strong engagement are usually associated with (a) user/system interaction and (b) dramatic peaks such as the reversal of fortunes within the interactive narrative. Additionally, strong engagement does occur where low dramatic levels are plotted within a dramatic arc, but decreases where there is little or no interactivity.

Figure 2 shows results from an analysis of a user's progress in the Role Playing Game (RPG) *Oblivion* (Bethesda Softworks, 2006). Results were calculated using the IFN to plot the level of drama and agency at each interaction combined with the user's self-reporting of the level of engagement at each interaction.

7 Conclusion

The claim advanced in this paper is that the inherent contradiction between authorship and participation often advanced as deleterious to 3D narrative occurs largely because of how narrative is conceptualized. In contrast to prevailing dramatic theories that view drama as an abstraction emanating from an entire narrative sequence, we view drama as a feature of the interaction between player and 3D environment at

each event throughout a narrative sequence. A methodology is presented that provides a technique for measuring drama, agency and engagement and compare the centrality of a designed interactive narrative with the emergent participatory narrative. Empirical results illustrate that a level of drama is clearly associated with an interaction expressed as a phrase. The adoption of the FrameNet semantic resource adds a degree of standardization and universality. The approach is presented as useful for analyzing engagement in 3D environments.

High Drama / High Engagement		
	Type	Interaction
1	Cross media	<i>User Discover</i>
2	User/System	<i>Victory</i>
3	User/System	<i>User Steals M Spells</i>
4	User/System	<i>User Cheats System</i>
5	User/System	<i>User Steals Gold</i>
6	Game Play	<i>User energizes M Spell</i>
7	Game Play	<i>User energizes M Spell</i>
8	Game Play	<i>Dog/Wolf attacks User</i>
9	Game Play	<i>User Hurls M Spell</i>
10	Game Play	<i>M Spell Tames Wolf/Dog</i>

Low Drama / Low Engagement		
	Type	Interaction
1	Cut Scene	<i>Display Cut Scene</i>
2	Cut Scene	<i>User Scans Cut Scene</i>
3	Cross media	<i>User Uses Internet</i>
4	Cross media	<i>User Resumes Game</i>
5	Game Play	<i>User Walks</i>
6	Game Play	<i>User Follows Compass</i>

High Drama / Low Engagement		
	Type	Interaction
1	Cut Scene	<i>System Frustrates User</i>
2	Cut Scene	<i>User Capitulates</i>

Low Drama / High Engagement		
	Type	Interaction
1	Creative Control	<i>User Creates Avatar</i>
2	Creative Control	<i>User chooses avatar features</i>
3	Creative Control	<i>User Ends Avatar Session</i>

Figure 2: Orthogonal analysis

References

- [1] **Aristotle. (c. 335 BC)** Poetics. In J. Barnes (Trans.), The Complete Works of Aristotle, Book II (pp. 2316– 2340). Princeton, N.J. USA: Princeton University Press
- [2] **Berkeley FrameNet Project. (2006)** Online lexical resource, <http://framenet.icsi.berkeley.edu/>.
- [3] **Bethesda Softworks. (2006)** Oblivion. Computer game.
- [4] **Bjork, S., & Holopainen, J. (2005)** Patterns in Game Design. Massachusetts: Charles River Media.
- [5] **Calleja, G. (2007)** Digital Game Involvement: A Conceptual Model. Games and Culture, 2, 236–260.
- [6] **Campbell, J. (1993)** The Hero with a Thousand Faces. Hammersmith, London, U.K.: Fontana. Harper-Collins Press.
- [7] **Crawford, C. (2005)** Chris Crawford on Interactive Storytelling. Berkeley, CA: New Riders.
- [8] **Damiano, R., Lombardo, V., & Pizzo, A. (2005)** Formal Encoding of Drama Ontology. In International Conference on Virtual Storytelling (p. 95-104).
- [9] **Elam, K. (1980 2006)** The Semiotics of Theatre and Drama (2nd ed.; T. Hawkes, Ed.). London New York: Routledge.
- [10] **Freytag, G. (1863)** The Technique of the Drama. Johnston Reprints.
- [11] **Hiltunen, A. (2002)** Aristotle in Hollywood: The Anatomy of Successful Storytelling (J. Florentine, Ed.). Bristol, UK: Intellect Books.
- [12] **Jensen, J. F. (2001)** Virtual Inhabited 3D Worlds: Interactivity and Interaction between Avatars. In L. Qvortrup (Ed.), Virtual Interaction: Interaction in Virtual Inhabited Worlds (pp. 23–47). London, Berlin, Heidelberg: Springer
- [13] **Louchart, S and Aylett, R. (2004)** The Emergent Narrative Theoretical Investigation. In P. Brna (Ed.), Proceedings of Narrative and Interactive Learning Environments NILE (pp. 25 – 32). Edinburgh, Scotland.
- [14] **Louchart, S and Aylett, R.S (2007)** Building synthetic actors for interactive dramas AAAI Fall Symposium on Intelligent Narrative Technologies. ISBN 978-1-57735-350-8 FS-07-05. pp 63-71
- [15] **Macfadyen, A., Stranieri, A., & Yearwood, J. L. (2007)** Online survey. <http://www.rosiemacphee.com/survey/>
- [16] **Mateas, M. (2000)** A Neo-Aristotelian Theory of Interactive Drama. In Working notes of the AI and Interactive Entertainment Symposium. Menlo Park, CA: AAAI Press.