

# Tilt Riders: Improvisational Agents Who Know What the Scene is About

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**Abstract.** The creation of autonomous agents for interactive narrative requires a heavy authorial effort, especially when the authors are concerned about integrating all possible story states in the agents behaviors. In this paper, we consider that the autonomous agents lack of narrative perspective over the action prevents them from successfully dealing with unpredicted story states. To deal with this problem we propose a conceptual model of story development for autonomous agents that endows narrative control to them. The proposed model is supported by our cognitive research with improvisational theatre actors and improvisational theatre theory.

**Key words:** Autonomous Agents, Emergent Narratives, Improv

## 1 Introduction

Agent-heavy approaches to interactive narrative have been a mainstay since the rise of the field in the 1990s. The Oz project [1], and CAIT [2] are early examples of applying behavior-driven agent architectures to creating interactive narrative experiences. Most research in this field[3–5] applied different strategies to follow the principle that stories can be dynamically generated by the interaction between characters in real-time systems, as long as they implement well-defined roles[6]. Designing such strict agents to interactive narrative environments adds a huge authorial burden to the design of interactive narrative environments. We contend that this is a direct consequence of the agents lack of authorial power, thus, shifting some of that authorial power to the agents would provide more dynamic interactions and consequently a broader possibility of experiences in agent-based interactive narratives.

The needed shift towards authorial agents depends on creating distributed story models that endow agents with the ability to reason about the impact of their own actions in the story development. This multi-agent focus on collaborative story creation has an obvious real world analogue in improvisational theatre (improv), *"a form of unscripted performance that uses audience suggestions to initiate or shape scenes or plays created spontaneously and cooperatively according to agreed-upon rules or game structures"*[7]. In improv, players develop stories by developing a shared understanding about a platform, which

is the collection of story elements that establishes who, what and where the story is happening[8]. However, the simple creation of a platform, such as a mellow/passionate couple (who) in heir honeymoon (what) entering their hotel room (where), is not much more than a description of the story environment, "the stability that precedes the chaos"[9], and it does not produce an interesting story by itself. It is up to improv players (actors) to introduce new elements to the scene that unbalance the established platform. Examples in this scenario could be the husband finding his spouse wearing his clothes and then have to adapt to the fact that she is the man in the house. Players tilt a platform in order to provide a story development towards the reestablishment of a new balance. *Tilt Riding* is the players action that arises from the need to adapt to the new tilted platform,

This work is part of the Digital Improv Project [10] which studies the cognitive processes involved in human improvisational performance with the purpose of constructing computational models for autonomous agents that exhibit improvisational behavior. This research is grounded in the analysis of more than seventy hours of performance, retrospective protocol, and group interview footage that we have collected during our study of real world improvisers.

## 2 Relevant Improv Background

Improv theorists such as Johnstone [9] and Sawyer [8] observed, that in spite of improvs intrinsic unpredictability, experienced improv players tend to fall into very high-level structural forms. They both report the tendency to fall into a storytelling sequence of three identifiable story subsets (*beat*) called *Three Beat Sequence* [8]. Johnstone[9] describes it as a pattern that starts with the establishment of a routine, which is the action that derives directly from a balanced platform. The first beat is followed by a disruption of the same routine that leads to the need of resolving the discrepancies elicited by the earlier disruption. During the first two beats that normally represent half of a scene, actors are encouraged to offer new material [8] and in the last beat they are encouraged to connect the elements introduced earlier in the scene.

Other relevant improv concepts, that result from the dialogue between improv players are *Dramatic Frame* and *Cooperative Emergence*. When two or more improv players improvise, their dialog results in the creation of a *dramatic frame* and a *story frame*[8], which are collections of all performance elements brought to scene. The main difference between them is that a *story frame* is an individual perspective, while a *dramatic frame* is a shared understanding of the same the story elements. These elements include among other: the characters enacted by each player; their motives and relations; the joint activity in which they are engaged; action location; time period; story genre; relation of the current joint activity to that plot and a large amount of implicit information (information that is presented without being directly referred), such as contextual information about an activity, place or time. In other words one may state that a dramatic

frame is a shared mental model between all players that contains the whole scene information, and story frame is an individual mental model of the same elements.

The process that leads to the creation of a dramatic frame is a turn-by-turn interaction called cooperative emergence, which is supported by two major functions *offer* (proposal of a new element to add to the frame, that may be related with any element of the dramatic frame) and *response* (validation of early proposals by integrating them in the dramatic frame or rejection of early proposals by disabling its integration or making it more difficult) It is the interaction between offers and responses that determines the cooperative property of the process. *Offers* with no *response* are kept in the individual story frame of each player, because it is only from *offer / response* agreement or disagreement that new elements may take part or be excluded from the dramatic frame. Only Confirmed offers can be moved from story frames to dramatic frames.

## 2.1 Tilt

A *tilt* is a change in the established platform that breaks the established routine, forcing action to adapt to the new circumstances. *"Tilting is all about balance. Bad improv is when balance is always maintained. Good improv shifts balance"* [9]. An example of a tilt in our data, starts with two characters emphasizing the benefits of fair trade products to their producers and how they are concerned about saving lives. They define a balanced platform where one of the characters exaggeratedly portrays being fair. Suddenly a fair trade worker walks in and starts revealing her poverty, exposing the real effects of fair trade in her life. At this point the players are forced to adapt their characters to the new facts. New action arises from the new unbalanced state.

Reports from our data suggest that players proactively look to establish solid dependencies between their characters and the environment in order to make them vulnerable to environment changes. In an example from our data it was interesting to see, that one of the players reports an intentional exaggeration of his characters attachment to the fair trade benefits, to prepare an interesting tilt: *"were building a set up, for exactly what she (other player) came for (...) we are going to be wrong about it (...) and I'm expecting it all to go wrong and it's gonna go in that track"*. Another player in similar circumstances comments: *"You should have an opinion about something (...) and then... something might happen that changes the environment which is the tilt..."*

In both cases the players rely that something on the unfolding action will change the environment and affect their characters, suggesting that a tilt is no exception to the cooperative aspects of improv in agreement with Johnstone [9] *"A tilt is just an offer of a tilt until its been validated by someone"*. Our working definition for tilt takes into account the whole action sequence that leads to an unbalanced platform instead of a simple action: a tilt is the action sequence that causes a significant alteration of an established platform that moves the story forward. We call the action that arises from characters adaptations to the tilted platform *tilt riding*.

### 3 Story Development Conceptual Model

Story movement in improv is a consequence of the action that arises from tilted platforms (tilt riding), when the players adapt their characters to significant changes in the story environment. Unfortunately, this does not happen when autonomous characters encounter unpredicted story states. Therefore, the main motivation for this work comes from the observation that autonomous characters in these situations would largely benefit from a computational model of tilt. However, our working definition is too high level to be implemented, since it does not determine the specific platform elements used in a tilt, and how they unbalance a platform. A major step towards defining such model, would be to determine the main functions used in it, which we contend to be part of the process of creation of a dramatic frame.

In the following we present a conceptual model of story development in improv (see Fig.1), that results from a detailed analysis of the performances, and post-performances data of the two best tilt examples of our extensive data set (see Table 1), that consisted on the annotation of the all platform variables in the story frames and dramatic frame.

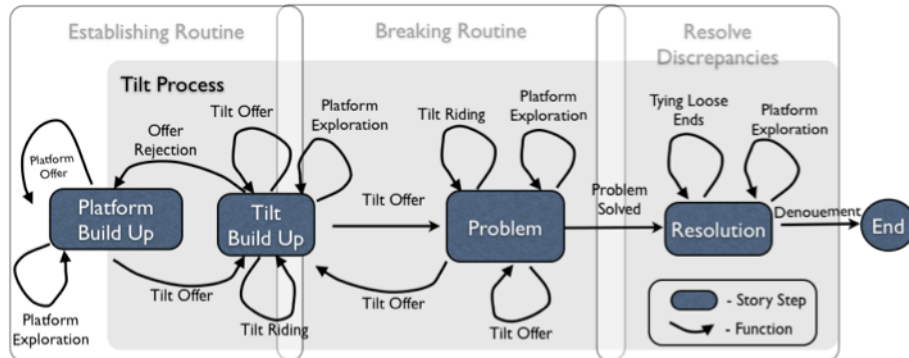
**Table 1.** Scenes A and B take 3:20 and 4 minutes, each is played by 3 actors in total of 6 different actors. Example A has 65 actor turns and B 76. In example A the final story frames include an average of 68 variables annotated for each actor, in example B this value is 84.

	Tilt Example (scene A)	Tilt Example (scene B)
Buildup	Players D1 and D2 emphasize how D1 saves the world selling Fair Trade products. D3 enters as his worker.	Three players (D4, D5 and D6) D6 is a serious no fun guy that teaches his friends how to behave in public places.
Tilt	D3 - Please feed me! D1 - <fails to explain himself>	D5 - <towards D6> Does she (D6s wife) hit you?
Effect	Player 2 - <shocked at D1>	D6 - I dont want to talk about it guys <avoids eye contact>

**Story Steps (Platform Buildup, Tilt Buildup, Problem and Resolution).** We have observed that players have different concerns over story development along a performance, that define distinct story moments. We call these story moments story-steps. In the analyzed scenes, we observed four different story-steps, each one with distinct priorities.

*Platform Buildup.* The first step is where players create a platform and establish a routine. In example B, D6 reports the definition of his character (who?) in the established platform: "this is where I thought I was going to be the guy that plays by the rules, in this relationship of 3 guys from college Im gonna be the dork."

Fig. 1. Story Development Conceptual Model



*Tilt Build Up and Problem.* Very similar story steps, that are responsible for breaking the routine. We observed in both analyzed cases that a larger tilt occurs after the initial tilt that breaks the established platform. This larger tilt leaves a heavier mark on the scene and represents a nuclear problem to be addressed. This is in line with Johnstone’s notion of minor and major tilts. Minor tilts are part of a buildup that moves the scene towards an inevitable major tilt. D6 from Scene B reports the occurrence of two different scene changes. The first tilt which we identified as a part of Tilt Buildup results from an insult of one of his friends to his wife: “Yeah and I wish you didnt have that wife and those children”. D6 comments this insult: “The scene is now shifting into something else, (...) where dealing with my wife which he doesn’t like, I’m thinking should I not like my wife or should I like my wife? And thats going to base my opinion about what he said.” From this moment on, the scene develops around D6s wife with growing conflicting opinions about her which end up leading to the offer “Does she (wife) hit you?” at this point D6 reports: “Now this is turning into a big tilt, which is a term for when a scene just takes a big turn into turning something else. A Big offer”. Also, in both cases we observed shifts in status and affinity. In example A the main shift was in D2’s affinity towards D1, and in example B there was a clear status shift for D6.

*Resolution.* This is the step where players look to resolve the tilt reasons in order to make the action fall into an end. (e.g. “at this point the clock in my head is going off. This should be wrapping up we should be finishing this scene.”).

## Functions

*Platform Offer.* Is used to add content to a story, such as character definition, story context, scenario, and other, with the goal of defining a platform that extends the space of possibilities in a story. Platform offers are mostly associative and use elements from the agents perceived story frame. An example from this

occurs in scene A when one of the players comments "*Hey, looks like you guys got a new line of muffins this morning,*" offering the existence of a muffin table in the scene. Explicit offer rejections can also be seen as offers of elements that can not be added to the scene. This requires the goal of building a platform that does not include the proposed offer (platform restriction), which means that a rejection may also be a platform offer.

*Platform Exploration.* The use of story elements within the current story platform without adding any new story development. It is recurrently used in every step without a direct impact on the story development when a player finds no alternative or just wants to establish a relation with the scene elements. An example of this is when a character in scene A offers a muffin to another player "*Here, have a muffin man.*"

*Tilt Offer.* Given a platform as a set of story variables, that represents the who? what? and where? story values, a *Tilt* can be seen as the transformation of a story platform, and its variables, into a new platform that is similar enough to avoid unresolvable inconsistencies and at the same time significantly different in some crucial variable sub-set (tilt variable). Based on this perspective and in the observations about status and affinity relevance in the tilt function, we propose that a tilt offer function should include a measure of similarity called Degree of Similarity (DoS) and a measures of differences called Tilt Potential (TP), that considers status and affinity.

The degree of similarity between two platforms could be expressed as quotient between the number of consistent elements (elements that exist in both platforms and with the same value), and the total number of elements of a platform. We propose to use TP as a measure of the variation of status and affinity, between the established and target platforms.

Now we can use the two measures presented above (DoS and TP) on the function of selection of the target platform, by stating that when proposing a tilt offer the agent should aim for the offer that maximizes DoS and TP.

$$targetPlatform(x)_{x \in \{Platforms\}} = arg Max_{x,y \in \{Platforms\}} (DOS(x,y) \times TP(x,y)) \quad (1)$$

*Tilt Riding.* Tilt Riding differs from platform exploration because it is not just a casual exploration of a platform, but an exploration of the platform elements that are more directly related with the tilt variable, with the purpose of increasing its importance and the characters attachment to it. An example of tilt riding in scene B occurs after one player insults D6's wife "Yeah and I wish you didnt have that wife and those children" and the scene grows with new elements related with the new variable "D6's wife". Other players keep adding elements to the scene against D6's wife, while he purposely fails to counter them. They start by finding her ugly, "manish", too tall, "mammoth shewoman", until they reach the new tilt where they offer that she hits D6. D6 accepts this tilt and rides it

by exploring the fact that he is a victim of abuse "I started acting like abuse victims act", changing his character.

*Tying Loose Ends.* This functions aims at slowing down the pace of a story after its conclusion in order to bring it to an end. In example A one player took advantage of the fact that everybody in the scene was drugged to justify the cognitive divergence state generated from his initial activity, "Oh my god! You've drugged this entire firm. No wonder I was breaking leaves in the break room." This is also inline with improv theory "A pointless story is one in which the recapitulation is missing or bungled, whereas a perfect story is one in which all the material is recycled"[9].

## 4 Conclusions

In this paper we propose a "shift in authorial power" to reduce the authorial burden of autonomous characters for interactive narratives. We contribute to the study of this hypothesis with the empirical analysis of real life improv players in analog conditions. We present a story development conceptual model supported both by theory and our data analysis, which includes self-report data from the subjects.

*Acknowledgements.* This work was partially supported by FCT (INESC-ID multiannual funding) through the PIDDAC Program funds. The first author acknowledges the FCT PhD grant (SFRHBD/37476/2007).

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