An Analysis of Narrative Moves in Improvisational Theatre

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Abstract. Our continued investigation into the experience of improvisers as they construct narrative in improvisational theatre provides a meaningful decomposition of its atomic unit, the offer. Our study was conducted with improvisers performing improv "games" in their theatre with each performance video recorded. Individual participants were selectively shown individual performances before being interviewed. This process is meant to elicit deeper information into how the performer chooses specific narrative interactions to develop in an improvisation performance. This paper presents our ongoing findings related to narrative development in improvisational theatre and how they were used to create an improvisational micro-agent. These findings have demonstrated that the use of offers to construct a scene involves the offers' acceptance and augmentation in a scene more than just the strength of an offer.

Keywords: Improvisation, Narrative, Cognition, Performance, Micro-agents.

1 Introduction

Synthetic characters in interactive narrative have been described as existing along a spectrum of autonomy [13]. *Strongly autonomous* agents [e.g. 2] rely solely on their own knowledge, goals, and actions to emergently create a narrative based on the user's interactions with the environment and the behaviors of other agents. *Weakly autonomous* agents, on the other hand, are given direction from a drama manger agent to coordinate their actions based on story-level goals instead of individual characters goals (e.g. [13]). A mixture of these two approaches leads to *semi-autonomous agents*, which can rely on their own definition when not being directed by a coordinating agent.

The responsibility of these agents is typically to portray either *instantial story content* (i.e. any system that employs a drama manger to dictate pre-authored story content) such as the beats used in Façade [13], the planning operators used in [23], or *procedural character content* (i.e. story content generated from agent behaviors or a story generation algorithm) [5]. Research on story generation has examined how to procedurally create stories, but typically in a non-interactive fashion and with limited successes to date. In other words, creating interactive stories that incorporate both a high degree of procedurality, such as in the story generation community, and high-

level story structure and goals, such as what is seen in weakly autonomous and semi-autonomous approaches to interactive narrative, is a difficult task not dealt with in current approaches.

We contend that the study of people engaged in real life interactive narrative experiences, such as tabletop roleplaying [6] or improvisational theatre [11], can elicit useful knowledge about how to create intelligent agents that can help tackle the problem of creating procedural experiences in interactive narrative. Improvisational actors construct a story for an audience in real-time without the benefits of explicit coordination or pre-planning. The result is that all of the actors hold a potentially high degree of agency in developing the story. An adaptive, story-rich experience with high agency for all agents involved makes improv theatre a real world example of what some interactive story researchers attempt to create [21]. This paper discusses our work on studying the cognition underlying theatrical improvisation as a means to better understand how improvisers reason about *narrative development* at an atomic level. This would ideally result in practical implementations of improvisational methodologies for computational development of narratives.

There are multiple conditions when an interactive agent may require improvisational behavior:

Story space breached by user: The user in an interactive story has executed a series of actions that has led to a world state not covered by authored story content. This could mean anything from physically altering the environment or a character (e.g., the canonical example of shooting an important character) to being in an unexpected social situation or conversation.

Story space breached by environment: Some series of events in a dynamic environment has led to a world state not covered by authored content.

Story generation recovery: An interactive story that has been generated (e.g., by a planner) cannot currently replan given a story state breach. An improvisational agent could keep the story goals in mind while improvising and keep *a story* going, even if not the one explicitly pre-authored. In the case of an educational application, an improvisational agent may be able to keep the desired pedagogical goals in mind while improvising a story, even though the initial dramatic goals can no longer be fulfilled.

Improvisational theatre: If authors want to create an improvisational theatre experience in computational fashion (e.g., [4]) it is unclear what approach would be more appropriate than to create improvisational agents for the performance.

It is with these situations in mind that the *Digital Improv Project* has sought to better understand human improvisation with the goal of creating improvisational agents.

Our previous work [3] has established how improvisational theatre fits into traditional narrative concepts and structures. However, just as having a field of narratology has not made creating interactive narratives a simple task, this narrative analysis of

improvisational theatre did not lend itself readily to computational representations. Just as Mateas and Stern reduced narrative moves in *Façade* to dramatic beats or Riedl and others have used planning formalisms, it is necessary to understand the proper atomic 'moves' that improvisational actors make so we can begin to understand how to formalize their decision making process and create improvisational agents.

Our work on narrative development in improvisational theatre has investigated the cognitive processes performed during an improv performance [11]. We collected retrospective protocols from individual improvisers and conducted group interviews post-performance [3]. Participants were prompted to continuously reflect on the performance as they watched it with little to no additions by the interviewers. Follow-up questions for clarity or depth were the only questions asked aside from prompting. The responses elicited were then annotated via an iteratively developed coding scheme. We analyzed this data by applying a bottom-up (data-driven) and top-down approach (using the Soar [10] decision cycle as a procedural framework, since our aim of this work is to build computational agents) for organizing and explaining our findings.

We were able to deconstruct narrative development in improvisational theatre at a high level. This enabled us to assess how basic narrative elements are created, developed, and implemented in an improvisational performance theoretical perspective [3]. We mapped these findings of an actor's individual decision process onto the Soar decision cycle of receiving external inputs, proposing a new operator to execute, elaborating internal knowledge, selecting an operator to execute, and finally executing that operator. This allowed us to formalize the offers made in a scene from input to execution (along with possible, but rejected actions).

We found, not surprisingly, that the discourse of improvisation was unique in that the content of the scene (the script or dramatic text's equivalent) was generated ad hoc. This involved multiple performers making and accepting offers (which became narrative events) over time. Sometimes performers would choose reportedly suboptimal narrative choices with the intention of keeping the scene from stalling (instead of advancing the scene) or getting a laugh from the audience. However, the main objective of improvisers was reportedly to make "strong" offers that would advance the scene. If the development and interaction of strong offers is the objective of improvisation (which our data has reflected), then a method for recognizing and formally modeling that concept is needed, more than our past work has exhibited. In other words, our initial narrative deconstruction was not robust or detailed enough to allow us to formally represent what a "strong" offer would be with a computational improvisational agent. Therefore, we have conducted a follow-up post-performance interview with local improvisers at their theatre to get more detail on, among other things, how they reason about their narrative decisions on stage. The interview questions assumed the full knowledge of our research up to that point and focused on character development, offer strength, tilt (emphasis of the scene), reincorporation, and scene development while attempting to leave them as open-ended as possible.

2 Related Work

The body of improvisation research has most notably come from studies of music improvisation. This work has yielded several general findings on the nature of improvisation as a creative human act. Improvisation is a constant process of receiving new inputs and giving new outputs [16]. An improviser must, in real time, be aware of one's fellow performers, interpret their actions, make both decisions about current events, make predictions about future events, remember what has already happened in the performance, correct errors, control their own physical movements, and integrate this process into a performance. There are a few methods for easing this cognitive workload. For instance, in musical improvisation, verbal commands can be exchanged to help smooth this process out [17], [1]. However, since all communication in theatre improv is diegetic, this method cannot be used. However, other tools of musical improvisation are still available to the theatre improv troupe; they may communicate with body language, domain-specific cues, and referent use [8], [22], [14]. A referent provides material for variation, allowing the performer to create a palette of pre-performance structures. An example of this behavior would be stock characters or mutual knowledge from outside of the scene.

There have also been implementations of theatrical improvisation in computational systems, however these systems tend to focus on creating experiences based on some particular aspect of improv techniques (e.g. character "status" [15]). In general, other virtual improvisational theatre systems have focused moreso on a shallow understanding of single aspects of improvisation, basing their work on improvisational texts or conventions, as opposed to understanding the cognitive mechanisms employed on stage [2], [19], [4].

Interactive story research is similar in many ways to the field of computational theatre systems [2], [19], [23]. The goal of interactive story systems is to attempt to tell a story in which the user has some agency (by performing actions or making decisions) in influencing the direction and/or outcome of the story. Swartjes' investigation into improvisation noted that several improvisation techniques (such as offer negotiation) would be useful in developing interactive narrative systems [21]. He proposed that work in the future would benefit from developing a system architecture that implemented improvisation techniques.

However, none of these projects have a) reached a deeper or more complete formal understanding of what improvisers do on stage at the individual or group level or b) attempted to computationally represent narrative understanding in improvisational agents, which would allow them to have more control over the progression of the story and work as a cohesive group to procedurally construct a story without relying on instantial story units like beats or plot operators. Our work on studying improvisational actors aims to address both of these points.

3 Narrative Units in Improvisation

Improvisational writings (such as Johnstone's *Impro: Improvisation and the Theatre* [9]) and our data from studying expert and intermediate improvisers, have commonly pointed to improvisers consistently making and accepting "offers" in an effort to "move the scene forward" across a variety of different kinds of scenes and situations, as well as coming to some functional understanding of what the scene is about. Johnstone describes an offer as "anything an actor does [is] an 'offer'. Each offer can either be accepted, or blocked." Improvisers have reported a similar definition, but within the specific context of an offer being something that is intentionally given to another performer (sometimes being described as "a gift given to your fellow performers"). Both from how improvisation is taught and practiced, the *offer* is a reasonable place to start with a narrative deconstruction. Without a formal understanding of what constitutes an offer in improvisation, it is immensely difficult to build computational improvisational actors who can reason about narrative schemas, conventions for improv games, etc. Subsequently, the response to an offer, typically referred to by the improvisers we interviewed as *accepting* or *rejecting* the offer, should also be included. However, an offer can be nearly any action executed by an actor in a scene; the term by itself is not useful as a formalism. The way in which an offer is interpreted and implemented in the scene is what actually constructs the narrative, therefore offering a formalism that is useful. The following subsections are an initial attempt at deconstructing the *offer* / *response* pairs seen in improvisational theatre into grounded atomic actions that can be subsequently used in computational theatre.

4 Construction of Narrative

As stated above, we are attempting here to formalize the different kinds of *offer* / *response* pairs we have observed by their reception rather than simply how the offering actor intended. Narrative is heavily constructed on stage by improvisers through this interaction of offering and accepting. The three types of responses are classified by how they interact with the offer: *Yes, And* (Accept, Augment), *Yes, But* (Accept, Redirect), and *No, But* (Reject, Redirect). This means that an offer is only canonically relevant to the narrative after it has been verified by another performer as actually true in the frame of the stage (REF: Keith Saywer's Improvised Dialogue book). Therefore, we define the offer / response pair as the core narrative move in improvisational theatre (as opposed to the sole canonical offer) and describe the different kinds of these moves below. By breaking down the concept of "offer" into individual classes based on the recipient's response, we can eventually better represent this narrative move in a computational framework.

4.1 YES, AND

The most common offer response that improvisers refer to is called *Yes, And* (or *Yes, Anding*). It consists of verifying that the offer's information is correct in the scene,

and then augmenting that offer. For example, in one unconstrained scene of *Game* (which is defined to the improvisers as "perform a scene" with either no constraints, a location and relationships given, or an entire plot given by the game host), E3 sits down on the ground as E2 and E1 begin to pantomime as if cleaning the floor. After being requested to move, E3 offers that she has "nowhere to go". E1 says, "I feel what you're saying, but …y'know… not everyone can win an electoral race. Somebody's gotta be the loser." With this statement, E1 has verified that what E3 has just said about having nowhere to go is true, and augmented her offer by building on top of it more information (why she is there and has nowhere to go). This is the process of *Yes, Anding* in improv and is commonly associated with the concept of offers in improv theatre.

4.2 YES, BUT

A less commonly observed type of response involves verifying and then redirecting an offer. This could be described as *Yes, But* (which is not to be confused with the blocking game of a similar name). This type of response to an offer describes a behavior observed within our data, but not necessarily an explicit strategy that improvisers report being aware of. When an improviser employs *Yes, But,* they are accepting an offer but redirecting the implications of that offer and therefore recontextualizing the other's offer. In one scene from our study of improvisers at their theatre, the performers were playing a game called *Blind Scene*. It consists of two performers developing a narrative by playing their characters in a scene whose content is suggested by the audience. However, only one of the performers knows the situation. The other performer is therefore 'blind' to the platform (i.e. general information about the scene such as characters, relationships, location, etc.). The improviser who knows the scene's context will try and inform the other performer about aspects of the scene while it plays out (such as their relationship and the situation they are in). In this example, the performer in the know is cast as a man who is in love with (and occasionally sleeping with) his landlady, who is the so-called blind actor. The improviser in the know described in the interview how the exchange of information develops in the scene, reporting that it was not his role to reject his fellow improviser's offers, but to accept them and somehow make them true in spite of her perceived original intentions.

One example of this is when the blind actor makes an offer of, "Oh my god! This is great you built a checkers table right in!" He affirms this as true to the scene, but redirects her exclamation with, "It's from the Renaissance Hotel," inferring that he has furniture similar to that of the other properties she owns. The performer in the know explained in his interview that he accepts her offers as true, but tries to redirect their meanings from what she most likely originally intended. This is different from a *Yes, And* move where one builds off of the offer in the direction intended by the other performer, by instead taking that offer and using a particular interpretation which is (in his view) useful for the scene to advance.

4.3 NO, BUT

The *No, But* is more typical in certain improv games, such as the game *Improbable Mission* featured on the television show *Whose Line is it Anyway?* Essentially, this involves making an offer, it being rejected, and then an alternate situation to the scenario being provided. An example of this comes from a game of *Narration Switch*. The way this game works is that two improvisers are on stage while two improvisers are off stage. The two off stage narrate the scene where the two on stage play characters. The host will call "Switch!" at various times causing the improvisers on and off stage to switch places (therefore, an improviser who has previously been a narrator would then go up on stage, while his vacancy as narrator would be filled by the former character's improviser). A cigarette becoming a snake horrifies a character in the scene, Maybury. The narrator states that Jesus "calms her down, showed her that the snake was nothing to be scared of." The performer rejects Maybury's offer of being afraid and redirects the scene in a different direction. None of the improvisers interviewed consider this type of redirection a block, but they do acknowledge it as a redirection in the scene.

This is because it gives the other performer what is needed to develop the scene. Keith Johnstone [17] said once in a retreat, "Does saying no give [your partner] what they want?" This may seem counter-intuitive, but is illustrated both above and in one of our earlier data collections which involves a rejected offer being met with a *No, But*. In a scene set in a zoo, two friends are picking on their third friend, implying that his wife is mannish. D7 (the one being picked on), responds with, "Maybe I like it rough, ever think of that?" D5 pauses and then says, "…I'd honestly never considered that. We kinda just thought she was just beating you up emotionally." D7's offer was firmly rejected by D5, but an alternate suggestion was offered in its place that opened the scene to a new and interesting path for the improvisers. D7 described this in the interview as a great offer because it caused the scene to develop, "[he] takes it to a great place, which is I'm actually an abused husband." D5 and D6 begin to soften their tones and ask, "Does she hit you?" and "What's going on?" as D7 turns away from them and says, "I don't want to talk about it, guys" and then turns back to them saying, "let's talk about what you did to that lion" which rejects their offer and tries to return the scene to an earlier topic (throwing snow cones at lions). D5 then rejects that rejection and redirects the scene towards the issue of D7 being abused.

This is a narrative example of the *No, But* behavior which the improvisers would not consider blocking because it gives the other performer what they want for the scene to develop: conflict. Understanding this as a separate kind of offer / response pair from the previous two pairs allows us to consider how to represent the cutting off of proposed narrative directions and the mechanism for proposing new ones.

5 Micro-Agent Implementation

With the aforementioned offer / response patterns in mind, we have created a computational agent that would help us explore these narrative moves. Our work has

currently focused on the development of *micro-agents*, which are agents that represent a single aspect of our formal findings [12]. The benefit of creating micro-agents is that it allows the exploration of individual cognitive concepts and all of the issues involved in creating an agent (e.g. interaction design, knowledge representation, environment design, etc.) without the overhead of building a more complex and less understood agent. We decided to initially focus on a very physical *No, But* interaction akin to the *Mission Improbable* game. That game consists of two performers trying to accomplish mundane tasks while each performer introduces a *No, But* solution to each problem. An example of this type of interaction would be one performer says, "Okay, let's take your car." The other would respond with, "Oh no! My car's in the shop. But, it's a good thing I installed rockets in my boots!"

The narrative platform for this micro-agent is that the cat is in its tree and the two agents below it want to get the cat out of the tree (see Fig. 1). The first agent is aware that it must *be at the same height as the cat* and must have something to *obtain the cat* (either by grabbing it or luring it). The agent will then make an offer of acquiring an item to be at the same height as the cat (which comes from a library of possible actions). The other performer either allows this offer, or rejects it with a contextual reason (e.g. the trampoline has a hole in it and cannot be used) redirecting the situation. This effectively exhibits a *No, But* behavior. If none of the prior attempts succeed, then the final attempt at locating working equipment shall succeed. After getting into the tree, therefore being at the same height as the cat, the agent can then obtain the cat (such as by using the cat magnet).

The Soar agent (which controls both of the visualized agents on screen) makes decisions for each of the characters, who take turns in the scene. A decision for either character is sent to Processing, which then animates the action for the given character on screen. One agent, the "savior", is given the goal of trying to save the cat caught in the tree while the other agent, the "trickster", takes the goal of conducting adversarial planning to potentially keep the cat from being saved. More specifically, the trickster agent reasons about the effects its actions has and selects actions that can block the other agent's proposed actions for saving the cat. If an offer by the savior is rejected, the trickster then calls upon one of its pre-defined "but" redirections. These are essentially new offers that point to an alternative route for saving the cat. The visualization of these interactions essentially comes across as offers by the savior that are either accepted or met with a *No, but* response by the trickster.

The program uses one instance to control the behavior of both agents, but it could be easily developed to control two different agents. This type of behavior is intended to model a variation of an adversarial search that would "maximize interestingness" by following the pattern of conflict seen in the aforementioned types of improv games [20]. Rather than possibilities being minimized until success cannot be achieved, instead success is met with conflict to stimulate interest. Interestingness in this situation can be described as an agent's schema of appropriate actions (or plans) being violated in such a manner that it contextually makes sense to the narrative while simultaneously raising an appropriate emotional response (in the user/audience) to the scene. The micro-agent currently creates the plans from a prescribed library of Soar

operators. While functionally similar to other planning schemes, its focus is different in its attempt to model the very physical *No, But* behavior (redirecting failures rather than procedurally attempting to convey a whole narrative with employing or modifying plans). While currently the micro-agent blocks and accepts offers due to purely random bias, future implementations intend to subject the agents to narrative preferences which would intentionally heighten drama through conflict and yield a more satisfying ending through reincorporation (such as an object's failed use earlier in the scene being implemented in the climax).

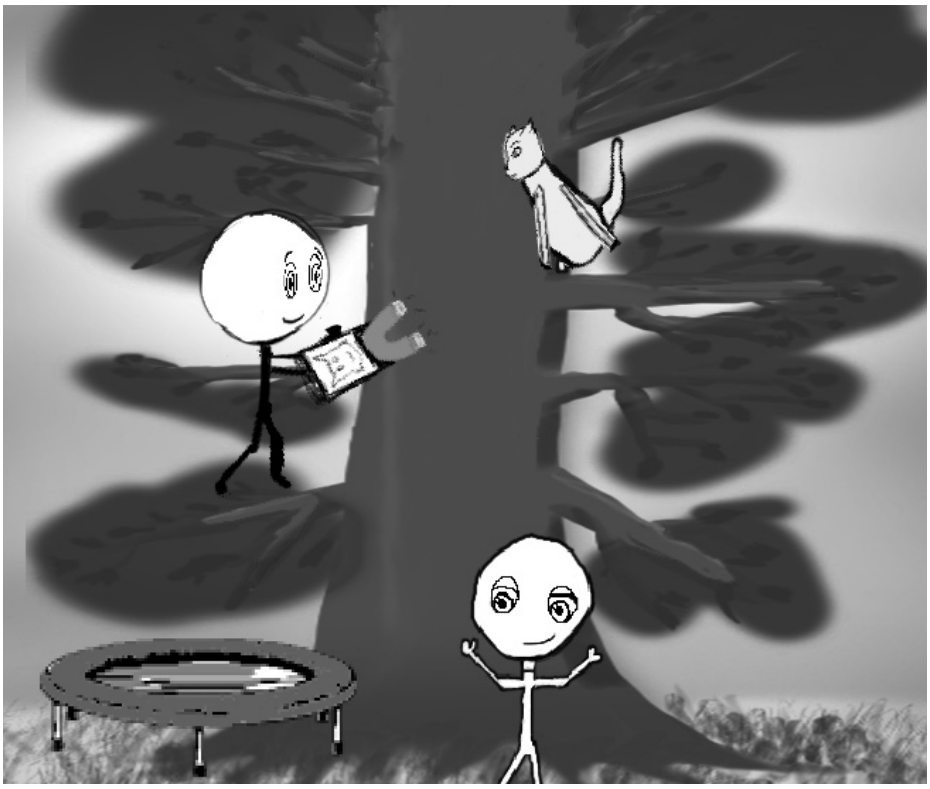

Fig. 1. – The first agent is using a cat magnet after a series of offers have failed.

6 Future Work

Our main goal in our future research is to implement practical uses of improvisational methodologies for development of interactive agents who can exhibit improvisational behaviors while reasoning about narrative. However, while this work has focused on *what improvisers* do, there is little understanding concerning *why* they do what they do (e.g. why do *Yes, And* versus *Yes, But* in response to an offer?) To clarify: consider the question of when does an improviser respond to an offer with *Yes, And* versus *No, But*, and why? If different strategies had been employed in the examples above, the

scenes would have been quite different. That is why this line of questioning is what we are currently trying to address and explore. The continued cycle of collecting data from real world improvisers, analyzing that data, then grounded that data in computational micro-agents (which in turn helps us better understand our data so we can then build more complex agents, etc.) will yield a better understanding of this phenomenon.

There are two significant next steps in our work on narrative and improvisation. This first is to form a synthesis of this and past work on narrative structure with the main group decision making that improvisers employ – the process of building shared mental models during performance [7]. This synthesis will help tie together the narrative structures and moves that improvisers reason about as individuals with the process of executing actions in a group setting in an effort to establish a coherent and interesting story.

The second step in our work is to begin to look at more affective features of improvised stories – i.e., how do improvisers make stories interesting? One commonly reported feature is the concept of a "tilt." The "tilt" of a scene happens after a platform has been established and "something interesting" happens that serves as the focus of the scene. Tilts are established through the processes listed above – making and responding to offers and reaching a shared mental model about the platform for the scene (i.e. where the scene takes place, who the characters are, etc.). Tilts seem to be common for quality scenes; understanding how they are negotiated and constructed will be crucial to creating a complete model of improvisation and narrative. This model can then be used to build computational agents who can improvise their own scenes.

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