

Storytelling with Interactive Physical Theatre

A case study of *Dot and the Kangaroo*

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ABSTRACT

This paper examines the way movement based interactive visuals were used as a storytelling device in the physical theatre production of *Creature: Dot and the Kangaroo*. A number of performers and artists involved in the production were interviewed and their perceptions of the interactive technology have been contrasted against a similar study into abstract dance. The animated backgrounds and interactive animal graphics projected onto the stage were found to reduce the density of script by describing the location of action and spirit of the character, reducing the necessity for this to be spoken. Peak moments of the show were identified by those interviewed and a scene analysis revealed that the most successful scenes featured a more integrated storytelling where the interaction between performers and the digital projections portrayed a key narrative message.

CCS CONCEPTS

•Applied computing →Performing arts; •Human-centered computing →Empirical studies in HCI; Empirical studies in interaction design;

KEYWORDS

Interaction, Physical Theatre, Storytelling

1 INTRODUCTION

This paper examines the way motion tracked interactive visuals were used as a storytelling device in Stalker Theatre's 2016 production, *Creature: Dot and the Kangaroo*. The 45 minute physical theatre show featured a mix of spoken word, music, song, physical movement and interactive visuals to retell the classic Australian children's novel *Dot and the Kangaroo*. The story follows the little girl *Dot's* adventure as she befriends a motherly kangaroo and begins to understand man's negative impact on the natural environment. The visuals are a combination of animated backgrounds, interactive particle systems and real-time visual effects that respond to the movement of the physical performers. This movement is

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Figure 1: Physical performers with the interactive platypus totem in *Dot and the Kangaroo*.

(Photo: Darren Thomas, ©Stalker Theatre)

detected by a camera based tracking system and mediated through virtual fluid and rigid-body simulations.

The theatre show was developed alongside an immersive playspace called *Creature:Interactions*, where children were able to interact with many of the creatures and locations depicted in the theatre production. The playspace was built with the same technology and shared many of the digital assets as the theatre show, but is considered to be a separate, albeit complimentary, artwork which has since toured independently from the show. Whilst experienced with interactive projection technology through previous collaborations with the authors, the *Dot and the Kangaroo* theatre show was the first time that the physical theatre company had incorporated a literal and spoken narrative into their work. This paper documents how the interactive technology was used to tell the story within the theatre show and how the focus on storytelling altered the artist's perception of the interactive system. A short video preview of the *Dot and the Kangaroo* show can be viewed at <https://vimeo.com/199996091>.

2 PAST WORK

There is a rich history of employing technology to augment the live physical performances in the theatrical, musical and interactive art domains. Whilst politically questionable, Richard Wagner completed the *Festspielhaus* in 1876, a bespoke opera house which contained mechanical technologies, acoustic design and a dynamic gas lighting system devised to augment his epic operatic masterpiece *Der Ring des Nibelungen* or *The Ring*[15]. In the early 20th Century Italian futurists Enrico Prampolini and Luigi Russolo used motorised props and mechanical structures to create brutalistic new theatrical and musical aesthetics [15][13]. Josef Svoboda mixed live theatre with eight mobile projection screens to create *Laterna Magika* which was presented at the 1958 Brussels World Fair [4].

Electronics and computer technology are relatively recent inventions, but the idea of physical interactivity in live performance swiftly followed with Nicolas Schoffer's 1956 *CYSP1* featuring a kinetic sculpture which reacted to dancers by way of microphones and photovoltaic cells [5]. In the 1980's David Rokeby employed computer technology to create an interactive sonic installation that employed video cameras and image processing techniques to convert a user's body position and motion into musical sounds [14].

Since the 1990's, an increase in computing power and the availability of affordable input devices has enabled a plethora of real-time motion tracked live performances. Movement based input devices have enabled musical performances using gesture such as Sonami's *Lady's Glove* [1] and Ilsar's *Airsticks* [8]. Camera based tracking was combined with simple biological simulations to create interactive art installations in *SwarmArt* [2] and *Sonic Tai Chi* [9]. Motion capture has been used drive a graphical display in many experimental dance performances to highlight and exaggerate movement trajectories such as *Dance.Draw* [11] and *Encoded* [10] which can be seen as a precursor to the work presented in this paper. Virtual dancers have learnt autonomous movement through machine learning [12] and simple interactive virtual actors have been placed into immersive CAVE environments [16].

While these examples all utilise real-time motion capture to highlight or exaggerate movement in live performances, they are all abstract explorations of movement based interaction through music, interactive installation or dance. Examples of motion capture technology used effectively to tell a story with a strong and literal narrative appear to be more difficult to find. *Troika Ranch* features real-time video playback controlled by motion sensors to realise their own unique blend of dance and theatre[3], but the majority of their productions utilise semi-abstract narratives.

Gonzalez et al. describe the pursuit of narrative based visualisations in *Whispering to Ophiuchus* as negatively affecting the interactivity and 'aesthetic harmony' of the projected visuals [7], signalling a potential conflict between the needs of narrative and movement based interactive visuals. There seems to be an abundance of abstract and semi-abstract live performance pieces that study technology's relationship with movement, while the effect of a strong narrative on this relationship and exactly how interaction may be used to tell a story remain relatively undocumented. With this in mind, this paper examines the use of full bodied interaction to tell the story of *Dot and the Kangaroo* and how it was perceived by the creatives involved.

3 SYSTEM

The interactive technology is based upon the fluid simulation developed by the second author for the *Encoded* physical theatre show in 2012 [10]. The original system used an infrared camera and optical flow algorithm to process the movements of the actors and apply appropriate forces to a virtual fluid simulation. As the performers move about the stage, they effectively 'stir' the virtual fluid which ripples and flows in response to the physical movement. Visual particles floating in this virtual fluid are pushed gracefully around the large 16x9m projection screen at the back of the stage. The physical setup was left unchanged for the new work, but as the *Encoded* performance was an abstract exploration of physical movement through the digital world, a series of software upgrades were added to the bespoke OpenFrameworks¹ system which allowed the children's story to be told with a more literal visual aesthetic. An attraction system was implemented where particles could loosely stick to the vertices of 3D models, allowing simple images to 'emerge' from the abstract particle system. *Bullet*², a rigid-body collision simulation, was added as an optional replacement for the fluid simulation, where particles would semi-realistically bump, rub and spin when in contact with one another. The particles can be attracted or repelled from the source of physical movement and when combined with the collision simulation this effect strongly resembles a flocking algorithm. A range of real time GLSL³ blurs, trails, masking and lighting effects were added and a layered compositing engine was built to combine the particle graphics, pre-rendered video and visual effects in real-time. All of these elements were added to the Puredata⁴ user interface which could save all of the new settings in easily recalled presets.

4 INTERVIEWS

Observations were made during the development period and interviews were undertaken with many of the cast and crew of the theatre show including three performers, two directors, the music composer, rigging master, costume designer and digital artist. The semi-structured interviews were roughly 40-60 minutes in length and focused on interactive visuals and how they affected the development period and final performance. The interviews were transcribed and coded using grounded theory [6] by the primary author and also by an independent researcher. The results of both inquiries were collated for a final round of analysis.

5 SPOKEN WORD

"Well, looking at it theatrically probably the biggest challenge was the integration of a narrative structure and that's particularly to do with the type of work that I've made and Stalker theatre has made traditionally. It's usual been non-narrative based and somewhere between abstract and semi-abstract so I think that was the biggest challenge."

- Artistic Director

¹<http://openframeworks.cc>

²<http://bulletphysics.org/wordpress/>

³OpenGL Shading Language

⁴<https://puredata.info>

The introduction of narrative and spoken word was a new concept for many of the Stalker team, but similarly the use of physical theatre and interactive technology was also very new to many of those more experienced in the use of text. In this way, a large part of the development process of this show was concerned with how to actually combine the physical performance and interactive visual languages with the spoken word.

The theatre show is an adaptation of a classic children's novel and the creative director recounts that much of necessary script work was a process of reduction. Firstly, decisions needed to be made about how to reduce the amount of text from the full length novel into something suitable for a 45 minute theatre show.

"It's really dense. So how can it be porous enough to accommodate all those other languages that are going to be telling the story" - Creative Director

The bulk of the script was developed prior to entering the rehearsal space, and the process of building the show became finding ways to represent the essence of the text through the physical and visual languages. The script represented the story that needed to be told. When other ways were found to tell a portion of the story, then it could be removed from the script and added to the choreography or visual elements. It was found that when the visuals were descriptive enough to alleviate the density of spoken text, it allowed the physical languages more freedom.

"those projections also supported that sparsity of text so that the movement... had more space to be because the pressure of the performers to describe everything was alleviated... the visuals were speaking about location, about spirit of bush, about magic." - Creative Director

5.1 Backgrounds

"I thought that the main breakthrough that was more obvious this time was all the 3D environment that was made as a background" - Rigging Technician

Perhaps the most obvious evolution in visual aesthetics from *Encoded* was the use of full screen visuals of the Australian bush. The colourful landscapes were modelled and animated in Maya and were initially designed to operate interactively, running inside the real-time TouchDesigner graphical programming environment. Unfortunately, the digital artist was not available for the full development period, and the scenes were pre-rendered as video loops to be played inside the fluid-simulation system. These visuals were largely viewed as a 'digital set' by the artists and acted as a background to the interactive particle objects running inside the fluid simulation. These pre-rendered videos depicted locations from the story, such as water holes, rivers, grassy plains and tree-laden bushscapes, allowing the lengthy descriptions of these locations to be removed from the script.

5.2 Totems

"a totem is something inherently personal and meaningful and so we managed via the interactivity to make those totems alive and responsive in a personal way." - Artistic Director

The *Dot and the Kangaroo* theatre show was inspired by the success of a one-off performance and interactive installation at a prominent outdoor arts festival held annually in rural Australia. A particle attraction system was developed for this event that allowed simple 3D models of Australian native animals to emerge from the fluid based particle display. The strength of attraction was altered throughout the event, dynamically shifting the visuals between one of very literal shapes to that of pure abstraction where the particles floated freely on the virtual fluid. The simple images of animals would warp and disintegrate in response to the physical movement on stage, only to slowly reform in response to a prolonged moment of stillness. This style of interaction and visual aesthetic was used extensively in the *Dot and the Kangaroo* stage show, appearing in more than half of the scenes as particles form the shape of the story's animal characters including a kookaburra, platypus, snake, bittern, dingo, kangaroo, willy wagtail and brolgas (see figures 1, 4 & 5). These graphical creatures were called 'totems' by the crew and represented the spirit of the characters on stage. They can be considered to play a similar but complimentary role to that of the animated digital set. Where the background landscape of the Australian bush provided a location for the setting of the action, the foregrounded totems describe the spirit of the animal characters in any particular scene permitting yet more descriptive text to be removed from the script. The 'totem' creatures would shift and warp in response to the actor's movement on stage and the interviews revealed that although often described as 'subtle', many of the crew thought the real-time reactions added sense of *depth*, *tactility* and *aliveness* to the visuals.

6 THE PEAK EXPERIENCE

"...we had the ability to make the stage come alive in a very particular way. I think those moments... they are a peak experience" - Artistic Director

When interviewing the performers, artists, technicians and directors about the experience of developing and performing *Creature:Dot and the Kangaroo* a number of scenes were consistently mentioned as being particularly successful. These scenes can be thought of as the 'peak experiences' sought after in a theatre show and the interactive system's role in making the 'stage come alive' can be examined during these scenes. The scenes identified were the *berries of understanding*, *bronze-winged pigeons*, *brolga dance* and *dingo attack*.

6.1 Berries of understanding

"the story centered around the transformation of the little girl, who kind of had her perception altered, so I think the visuals really helped us paint that transformation of perception on stage beautifully." - Creative Director

The story of *Dot and the Kangaroo* is based around a little girl (Dot) befriending a mother Kangaroo (Mrs K.) and embarking on a personal journey of environmental awareness set in the Australian bush. Somewhat reminiscent of Alice passing through rabbit-hole, the narrative device used to enable this journey is the magical properties of the 'berries of understanding'. Mrs K. offers Dot the berries and as she eats them she becomes hyper-aware of her



Figure 2: Berries of understanding

(Photo: Darren Thomas, ©Stalker Theatre)

natural environment and can talk to the native animals. This is a pivotal moment of transformation in the story and was represented in the theatre show by the interactive particle system.

As Mrs.K starts to talk to Dot and offers the berries, the two performers start a simple unified dance of tumbling and rolling about the stage. Simple white particles are emitted and flow about the stage in response to their movements. As more berries are taken, they move up to the slings and swing about the space where coloured particles are generated from their movements. The particles slowly start to settle down and reveal a coloured 3D rendering of the Australian bush.

The visual effects used for the berries were seen as an important storytelling device where the shift to colour and a more realistic 3D animation style visibly portray her transformation by showing the Australian bush somewhat 'coming to life'.

6.2 Bronze-winged pigeons

"I think the birds were fantastic... when the performer did something to the birds, well the birds flew away so I think a lot it was talking to children about looking after, being conscious of the footprints we are creating in the bush, so I think the interactive technology is doing that in a way too." - Creative Director

Shortly after Dot is transformed into a state of understanding by eating the berries, she travels to a watering hole with the kangaroo where she comes in contact with the bronze-winged pigeons. The birds are flying around the trees as they are afraid of the human Dot and refuse to come down to the watering hole. After seeing Mrs K the Kangaroo enter the water hole, the pigeons gain courage and come down for a drink. This scene marks the first time that Dot realizes that animals and birds are afraid of humans and is the first step in understanding man's destructive impact on nature. The scene has all of the performers nestled high in the slings pretending to be birds, while the narrator breaks character to interact with digitally projected birds that are flying all over the entire projection canvas. The interactive system uses rigid-body collision combined



Figure 3: Bronze winged pigeons

(Photo: Darren Thomas, ©Stalker Theatre)

with attraction forces to simulate the flocking behavior of the birds in reaction to the narrator's movements. At first they are attracted to the trees and strongly repelled by the movement of the narrator, but as they gain confidence they are attracted to the waterhole on the bottom of the screen and are less disturbed by the human presence of the narrator. Finally, the attraction to the waterhole is removed and the digital birds all fly away to transition into the next scene.

6.3 The brolga dance

"Brolga's always been my absolute favourite... I brought my daughter in one day and she watched bits of it... but when the brolga moment came up she sat down next to me and she said 'That's so beautiful' " - Narrator

On her journey to find her way home, Dot comes across a flock of brolgas and joins them for a dance. The inclusion of Dot in the brolga's dance is evidence of her transformation into 'being at one with nature'. The scene contains little or no spoken word, focussing on the dance performed by three physical performers swinging around the room in choreographed unison. The dancers are accompanied by prerecorded melodic music with a live vocal harmony. The interactive system displays a pre-rendered waterhole animation with three large brolga 'totems' displayed in wireframe on top of the background. The background imagery and the totems both shimmer and sway in response to the swinging movements of the live dancers. This background shimmer is technically achieved by feeding the motion capture data into a fluid simulation and warping the pre-rendered animation in response to the fluid. The totems are influenced by the same fluid system but consist of a series of particles floating on the virtual fluid that are attracted to the vertices of a simple 3D model of a brolga. The background and foreground elements react to the rippling fluid simulation, creating a sensation of viewing the reflection of a pool of water.



Figure 4: The brolga dance

(Photo: Darren Thomas, ©Stalker Theatre)

Although only subtly different from interaction used for the kangaroo, kookaburra, platypus, bittern and willy wagtail characters, the tight rippling motion of the foreground and background elements was especially appreciated many of those interviewed.

6.4 Dingo Attack

“I keep coming back to the dingo moment and the bronzed winged pigeons ... those are the two really wonderful moments where you are interactive with this other character and it becomes alive?” - Narrator

After performing the dance of the brolgas, Dot rejoins Mrs K. the Kangaroo and they watch the moon rise and darkness fall upon the stage. In perhaps the scariest scene of the entire show, dingos start to surround the two heroes and Mrs K. sends Dot to safety before attempting to fight off the alpha dingo herself. A large totem figure of a dingo's head and torso emerge on the top right of the projection screen and the performer playing Mrs K performs an extended flying kick at the dingo, using the sling as a giant swing. As Mrs. K makes contact with the Dingo, it's form starts to dissolve under the force and a series of red particles are emitted from the impact to represent the blood resulting from the ferocity of the impact.

6.5 What makes a peak?

The cast and crew identified these scenes for a number of different reasons. Some enjoyed the integration of story telling with physical movement, some thought that the mix of abstraction and literalism was particularly enjoyable and one performer just enjoyed the challenge of learning a new physical apparatus. With a surprising consensus of which scenes were successful but differing opinions about why these scenes were enjoyed, the scenes were



Figure 5: Dingo Attack

(Photo: Darren Thomas, ©Stalker Theatre)

analysed with respect to interaction, visuals, music, spoken word and physical performance to see what elements remain consistent throughout.

When comparing these scenes, the main theme that emerges is one of variation. Each scene uses a different type of interactive aesthetic, visual effect and render style. The berries scene uses a free-flowing particle effect, pigeons uses rigid-body flocking, dingo uses a totem with particles for blood and the brolgas use 3 totems and a fluid warp. Three of these peak scene use the fluid simulation and only one used rigid-body particles to mediate the movement into the virtual realm, indicating that both systems were effective, but the fluid was possibly more successful. The bush landscapes were used differently throughout with the pigeon and dingo scenes using a fairly static backdrop while the berries and brolga moments used visual effects to make the pre-rendered backdrops interactive to the physical movement. The amount of spoken word also varied across scenes with the dingo relying heavily on spoken narration to accompany the action while the brolga scene went almost wordless. Many of the scenes featured musical accompaniment while the pigeon scene relied on field recordings of bird sounds rather than music to underpin the narration and physical action. There were a different number of actors in each scene, and the style of physical action varied from rolling, running, hanging to swinging. While the actions varied from scene to scene, in every peak moment there was some use of the rope like slings to augment the choreography. The other common element was the amount of movement in the reactive foreground visuals which would span the entire canvas of the large projection screen, creating a large scale visual spectacle.

7 SCENE ANALYSIS

“you’ve got to give it breath and space. It’s like in a jazz improvisation, you can never have all of the instruments playing all the time.” - Artistic Director

Examining the similarities of the more successful scenes has revealed a high level of reactivity and wide reaching movement in

the projections and a large variance in the other aesthetic and performance elements. By extending the scope of the analysis to look at the entire show we can see larger patterns emerging throughout the piece and find what techniques the director has used create a sense of 'breath and space' across the multiple elements of the work. The entire production was split into 17 separate performance elements which were grouped under the four main categories of visual projection, physical performance, sound and interactivity. These performance elements included style of movement, number of physical performers, use of visual effects, colour palette of projections, physical simulations type and music style. A short description and level of intensity was assigned to each element for every scene of the show.

The scene analysis revealed that the majority of elements were heavily featured throughout the entire piece and would naturally ebb and flow in style and density. There were two elements, however, which were used sparingly and roughly correlate with the peak moments. These elements describe how the digital projections are being acknowledged or used by the actors (*digital acknowledgement*) and how the real-time *visual effects* are being used.

7.1 Digital Acknowledgement

Throughout the majority of the show, the actors interact with one another both physically and verbally whilst either looking at each other or in the general direction of the audience. As the visual graphics are projected onto a flat surface at the back of the stage, the actors almost never face the projection screen directly. While both the interactive particle based graphics and 3D landscapes are synchronised with the location and details of the story and react to the movement of the performers, the actors rarely even acknowledge the existence of this large scale visual world. There are only four brief but distinct moments in the entire show where the actors themselves are given the permission to witness the visual world surrounding them.

The most obvious of these moments is during the pigeon scene where the narrator breaks character to run and shoo the interactive pigeons away, treating the virtual birds as live characters. Another obvious moment of physical interaction is the dingo fight where Mrs. K the kangaroo issues two deliberate swinging kicks at the giant dingo totem which crumples and disintegrates in response to the actions of the brave kangaroo. Whilst the actions of the performers aren't specifically directed at the screen during the berries of understanding moment, the actors allow themselves to look at the screen and notice their influence on the surroundings as the world comes to life in direct response to their giant swinging motion on the slings. This acknowledgement of their actions strengthens the causality between their own actions and the reactive bush landscape and is a pivotal moment in Dot's journey towards enlightenment. The final moment of acknowledgement is where the actors and narrators pause and watch the animated moon rise high above the stage before continuing the narration.

Three of these four moments of acknowledgement occurred within peak scenes indicating a probable link between the two. The moon rise scene is not interactive and was not popular enough to be named a peak scene, but was noted as a highlight by the Artistic

Director, strengthening the link between acknowledgement and the perceived success of a scene.

7.2 Visual Effects

The real-time visual effect capabilities of the immersive system were also used relatively sparsely, featuring in only five of the 26 scenes identified in the show. The effects used include trails, blurs, masks and warps and featured in the waterfall, berries, brolga, moths and dingo scenes. The trail effect creates a comet-like tail on moving particles as it bleeds the information from one video frame onto the next, revealing a smooth trail of motion. It was used in the waterfall scene to depict the froth and intense falling movement of the waterfall in which Mrs K. hid from the dingos early in the piece. The trails were also used in the moths scene to make the swarm of bogon moths have a foreboding presence as their black motion trails effectively swallowed up the night sky leaving the scared Dot in complete darkness. The dingo scene used the blended motion blur of the trails effect to turn red particles into a flowing blood effect which spurting from the dingo totem and stained the projection surface as it dripped downwards from the injured beast.

The masking effect allows the interactive particles to effectively reveal another layer of visuals. This effect was used in combination with the trails and a subtle blur to progressively reveal the pre-rendered landscapes as particles flowed freely from the swinging actions of Dot and the Kangaroo. The visuals in this scene were made of multiple interactive particle layers with varying degrees of blur and trails effect on them to smooth out the particles over time. As masking was progressively applied to each layer, the Australian bushscape appeared to magically come to life in response to the performer's actions.

The brolga scene features a warping visual effect in combination with a highly reactive fluid simulation to make the graphics have a particular shimmer representing the reflection of a rippling pool of water. The warping effect works by shifting pixels of a pre-rendered video layer based on the brightness of an interactive particle layer. In the case of the brolga scene the interactive layer was a visual representation of the fluid-simulation and the pre-rendered video was the animated landscape background. Warping the background with the same fluid-simulation that moves the brolga totem graphics tied the two visual elements together and they responded similarly to the movement of the performers.

Although these visual effects were used sparingly throughout the production, they do feature in the dingo, brolga and berries scenes, constituting three of the four peak moments during the show. As the effects were also featured in two scenes not labelled as peak, the mere presence of visual effects were not enough to make a certain scene peak. While certainly not a direct cause of a scene's success, the high incidence of visual effects within peak scenes indicate that they may have been a key ingredient.

7.3 Integrated Storytelling

The peak scenes all contained a high density of every element, suggesting that an efficiency of language in any one medium was not crucial, but instead storytelling that occurred across many different elements produced more fruitful results. The coloured backgrounds and interactive totem graphics present through most

of the performance described the location and spirit of the story but largely assumed the role of a 'living' digital set. In the more successful scenes identified, the system was designed to actually tell key moments of the text through interactive visual effects. The free-flowing particles in the berries scene gradually reveal the fully animated bush landscape telling the story of Dot transforming into an altered state of understanding. The interactive flocking of birds in the pigeon scene tell the story of nature's fear of humans and confirm the notion that Dot's actions have serious repercussions to the animals living in the natural bush environment. The combination of landscape and totems moving in unison to the brolga dance show the audience that Dot is becoming one with the natural world around her. The progressive disintegration of the dingo totem and splurging forth of bloody particles describes the gruesome nature of the kangaroo's triumphant victory to the audience. Rather than simply describing the location and spirit of each scene, the interactive system portrays key elements of the narration during the peak scenes elevating its role from one of a digital set to become a true storytelling device.

The peak scenes of the show also contained the rare instances of actors acknowledging or actively interacting with the large projection screen. This deliberate interaction between human and digital suggests that the story is being told by both mediums in combination and permits the audience to focus attention on the connection between performer and digital environment. The berries and brolga scenes also link the performers movements to the animated landscape visuals through interactive visual effects. This coupling allows the particle and pre-rendered graphics to work in unison with the actors and briefly prevents the cognitive separation of background, foreground and performer that is present through most of the show.

8 THE STORY OF SHIFTING CONCEPTIONS

The interactive system used in *Dot and the Kangaroo* evolved from the 2012 dance and physical theatre work *Encoded* and the productions employed many of the same performers and creatives. A similar interview process was undertaken during the *Encoded* development[10], revealing a number of different ways that the performers and creatives were conceptualising the technology. We can compare the opinions expressed during the two developments to identify if the emphasis on storytelling has altered the way that the creatives perceive the interactive visuals.

8.1 Multiple Roles

The different team members of *Creature* saw the interactive projections as fulfilling different roles in the production, with some describing multiple roles that shifted throughout the entire interview. There was a perception that the interactive system was almost like having another *character* on stage to interact with.

"it's almost like another character I guess on stage.

So you can't not interact." - Narrator

Many of the crew saw the visuals, particularly the rendered bush landscapes as an animated backdrop or digital set that would merely describe the location for the live action.

"I mean this in the nicest possible way, it was like a digital set." - Sound Designer

Despite being run from the same system and displayed on the same screen surface, the Costume Designer viewed the bush landscapes and the interactive particles as being two separate layers with different depth qualities. She simultaneously describes the projected imagery as a *digital set* and a source of *lighting*. This view reflects her professional relationship with these two mediums, ensuring the costumes aesthetically match the set design whilst also concerned with the quality of reflected light that results from choices in costume materials.

"unquestionably light was the set in that work. In all it's different, or the 3 major categories of it....[landscape] animations, and the interactive work and then the lighting. And it's a classic thing that lighting designers sculpt with light, so in the work we have 3 light sculptures happening" - Costume Designer

The artistic director relates to the technology through the concept of a *mask* which has been traditionally used in theatre practice to anonymise and/or influence the movement and presence of an actor. The framing of a mask allows him to see the technology as being some kind of actor/set hybrid, as it has its own presence that is both influencing and being influenced by the actors at the same time.

"It's almost like if you put on a mask, there is a different type of presence that you use as an actor. As a director what I perceive when we have the interactive technology, alive, is again there is a type of presence being manifested on stage and that presence is almost like another actor but not quite. Is it a mask? In a mask sense you are possessed by the mask. But it's a diffuse mask that is affecting all of the space... we are creating a living, a kind of living, breathing set, and that is the difference." - Artistic Director

In 2012, Johnston found that the cast and crew of *Encoded* also viewed the interactive system in a number of different ways including a *contact improvisation dance partner*, a *movement amplifier* and an *interactive theatrical mask* [10]. While the system is seen in a number of roles in both productions, the type of roles has changed. The visuals used in the 2012 physical theatre piece are described as a way to change the *movement* of the dancers either through contact improvisation, movement amplification or masking. The *Dot and the Kangaroo* projections are described through traditional theatrical *storytelling* elements of a character, set, or lighting design. Even when viewing the technology as a *mask* in both productions, the Director mentions the 'movement of the body' when describing this effect in *Encoded* and 'actors', 'presence' and 'sets' when describing it for the theatre piece. The conceptions of the technology shifted from being movement or dance based to being one of storytelling. Whether this shift of focus has resulted from the way the technology has been used, or if the perceptions have themselves been 'masked' by the nature of the production they were used in is still unclear.

8.2 Dominating Beast

Throughout the development of *Encoded*, there was a fear that the spectacle of the projections would dominate the humans on stage. After three and a half years of touring the show, this fear seems to have been alleviated with one of the performers stating that “Stalker is very familiar with the visual and the movement”. In fact, she described the challenge of *Dot and the Kangaroo* as being “two different languages having to come together”, with the visuals and movement being described as one language and the spoken language being the other. The fear appears to have shifted from one of projection spectacle dominating live human movement, to a fear of imbalance between the narrative or spoken word and the visual elements. The Creative Director was wary of allowing the spoken word, or text, to dominate over the physical and visual languages.

“we needed to constantly be conscious of not letting the text dominate the piece, that there are other languages that can tell the story really viscerally and they did. ...I think we achieved a really good balance” - Creative Director

While the Creative Director enjoyed the final balance achieved in the show, many thought that the production relied too heavily on the spoken word to tell the story.

“I find spoken word demands to be in the foreground. When you put spoken word and movement, maybe it’s the literal beings that we are the spoken words want to move into the foreground and in that sense I thought that [the narrators] at times were upstaging [the physical performers]” - Composer

Whether or not the spoken word indeed dominated the physical performance, many thought that the script was still too wordy and conflicted somewhat with the visual storytelling.

“I felt like we could do with a lot less script because there was so much happening... I was talking and the kids were not paying attention to me... they were listening but they were taking in what they were seeing far more than what they were hearing.” - Narrator

It seems that the interactive projections have lost the title of ‘dominating beast’ and the spoken word has assumed it’s role on the forefront of everyone’s conscious.

9 CONCLUSION

The *Dot and the Kangaroo* theatre show combines physical performance with spoken word, live music and interactive graphics to retell the classic children’s novel. The interactive totems, pre-rendered landscapes, acrobatics and physical acting complimented the spoken narration throughout the show and reduced the density of script needed to effectively tell the story. The scenes where the interactive visuals were used to convey important aspects of the narrative journey were identified by the cast and crew as being the peak experiences of the show. These moments featured the actors acknowledging their impact on the visual projections and combined dynamic physical movement with free-flowing interactive graphics to generate large scale animations across the entire

projection canvas. In these peak scenes, the spectacle of large scale interactive projection was successfully integrated with the physical performance to convey the protagonist’s journey through narrative driven physical interaction.

The creatives involved in developing the show perceived the interactive visuals in a number of different ways including that of a *character*, *digital set* and *theatrical mask*. Whilst these perceptions were still varied in the 2012 *Encoded* dance production, the introduction of a strong narrative and script has shifted these perceptions from being movement related to largely storytelling based. The fear of imbalance has also shifted from one of projection vs human, to one of visual vs spoken. This change suggests that people may draw on past experience to make sense of them but are framing their perception of the technology with the immediate challenges of the current artistic endeavour, in this case the introduction of a literal narrative script.

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