

“Make it so...”: Communal augmented reality and the future of theatre and performance

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Abstract

Digital technology continues to change and transform the way audiences interact with art and entertainment. The impact that streaming devices and high-definition recording equipment has had on the actor's craft, in particular, is irreversible and the increasing prevalence of digitally rendered characters and animated stories has changed the performative storytelling landscape forever. This article reflects on the increasing evolution of reality-augmenting technologies and proposes how these might influence and benefit the development of theatre arts and live, dramatic performance. It is argued that while the technology is not yet at a point where it can most-usefully supplement the established ability for traditional theatre to generate fantastic worlds in the minds of its audience, projection-based augmentation is rapidly moving towards a point where it can take the dramatic arts to their next evolutionary level. Rather than supplanting the actor and nullifying their specialist skills and artistry, it is predicted that this technology will encourage the live performer to heighten their artform and allow them to use advances in digital entertainment to serve theatre and performance, and its audiences, well into the future.

Keywords

Performing Arts; Theatre; Art and Technology; Practice-led Research; Augmented Reality and Theatre; Projection Mapping and Performance

In the creation and presentation of live, embodied, performative and imaginative worlds through storytelling it is argued that the comparably traditional methods of theatre and dramatic performance making maintain an edge over current digital technologies in their reliability, usability, adaptability and flexibility. Able to be presented with as little as human bodies in space, and for a community of individuals to experience the performance collectively and simultaneously simply by being present, there is a sense of inclusivity and a desirable element of shared-experience at the centre of the theatrical performance that does not currently exist in some of the most popular

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forms of digitally supported imaginative world-making, which can literally immerse users in the un-real and detach them from those around them. What is more, to oversimplify the point, the theatrical experience as we most commonly know it generally places little onus on audiences beyond getting to the performance space and finding somewhere to sit², while immersive technologies often demand audiences to bring their own devices, or to don equipment seemingly designed with function prioritised over comfort and ergonomics.

Theatre scholar, Michael Mangan (21-27), provides a detailed discussion on the imaginative interactions that occur between audience and live performer in order to generate a believable experience when viewing theatre, ideas which I have also analysed in previous writings (Pike "Articulating the Inarticulate: Performance and Intervention in Masculine Gender (Re)Presentation"; Pike "A Role to Play: Investigating Concepts of Masculinity in Australia through Theatre"). In short, however, through the persuasive technique and skill of the artists – generally a collaborative effort between a writer, director and actor – each audience member of a dramatic artwork becomes the creator of their own imaginative world of the story, seeded by the artist's creative offerings.

Augmented Reality (AR), on the other hand and for example, creates the world of the story outside the mind of the audience so that the fantasy is not generally conjured in the audience's imagination, rather, they are brought into the imagination of the person(s) who have digitally designed the world. Each audience member/participant shares in the uniformed world of the creator, which becomes an enhanced version of their everyday, real-world experience. Theatre, by contrast, asks the audience to draw on their real-world, lived experiences and complete their own fantasy by virtue of what is presented to them onstage. The moment in time this article looks towards is when digital technology will find seamless integration into the more traditional, theatrical conventions to enhance and support the dramatic worlds created and ideally conjoin the fantasies of the creators and the audience rather than, it is argued, the current state of affairs where the digital and the dramatically, tangibly embodied still find an uncomfortable friction.

As others have pointed out, the ability for live, embodied, theatrical storytelling to create fantastic and other-worldly experiences, in the minds of an audience, is well-established and perhaps best summed up by Shakespeare's Chorus in *Henry V*:

*Piece out our imperfections with your thoughts;
 Into a thousand parts divide one man,
 And make imaginary puissance;
 Think, when we talk of horses, that you see them
 Printing their proud hoofs i' the receiving earth;
 For 't is your thoughts that now must deck our kings, (Rogers 13).*

² Leaving aside the accessibility issues that some performance venues present to certain members of the community, which are very important issues but not the focus of this article. An extension of this point, and this article for that matter, along these lines is how technology can be used to improve accessibility issues for live theatre and performance. The focus here, however, is where digital and traditional might merge in the act of bringing the creative, storytelling concept to "reality".

Alongside this poetic explanation of how imaginative (re)constructions of fantastic worlds are conjured in a live theatre audience's mind, augmented reality scholars Julie Carmigniani and Borko Furht draw on the following explanation of how technology attempts to achieve a similar end: "Augmented Reality (AR) [is] a real-time direct or indirect view of a physical real-world environment that has been enhanced/*augmented* by adding virtual computer-generated information to it" [original emphasis] (3). Based on these explanations, it is further reinforced that the detailed world of a traditional play is conjured *inside* the mind of each individual audience member, while AR generates a world *outside* the minds of the audience. What these two contrasting methods of fantastic world-making have in common, is that they are both based *in* the mind of an overall creator: the artist/designer/storyteller whose imagination ultimately conjures the world the audience will enter, whether that be physically or metaphysically.

As the uptake of AR enabled mobile devices increases, this technology is becoming more and more usable. However, there is no escaping the fact that the hardware required to interact with this technology currently and generally limits the experience to those with access to an enabled device. Furthermore, wearable devices (such as the Oculus Rift or Samsung Gear, for example) actively shut-out the "real" world by requiring an individual to wear closed-in head gear, arguably defeating the purpose of an enhanced or augmented reality where the reality and the augmentation are effectively separated for the user and not so much enhanced, as simply re-created on a digital scale. In this respect, requiring individuals to wear a device that separates them from their outside world is not ideal for a creative project with the aim of bringing the fantastic into the everyday. There is the risk that the experience simply becomes watching an interactive 3D movie rather than being part of a live, shared experience, the novelty and appeal being that the movie is watched in a location that is not a cinema or the user's living room. There is also the potential for some users to suffer unpleasant physical reactions to wearable devices, such as headaches, nausea and vertigo, significantly limiting the appeal of the experience.

Other technologies, such as three-dimensional projection mapping, do allow for a shared experience – a critical element for the transformative nature of live performance that cements it as a vital social and cultural necessity and, importantly, "the occasion on which we confirm our shared humanity" (Alfreds qtd. in Purcell 75). The complexity in coding and design for this kind of projection for creators of imagined worlds can, however, limit the technology's usefulness in a live, storytelling context without access to affordable and willing technicians, engineers and scientists skilled in the area. The requirement for screens on fixed tracks or immovable, carefully aligned set pieces to receive the projection may also interfere with the practicality of the performance space. As outlined below it is in the development of these technologies, though, towards less rigid forms of communal augmented reality that traditional theatre and technologies of entertainment may very well find their integration.

Focusing on creators of live art and entertainment there is also an argument that the current theatre making practices remain more realistic, affordable and efficient, in terms of transforming the creative vision from idea to an embodied/embodiable reality,

and leave limited persuasive reason as to why makers should more stridently embrace emerging technology, particularly for the small to medium theatre sector and especially for independent theatre artists. Performances that utilise Virtual Reality (VR) and/or AR technology, represented by screen-based digital projections or portable platform-based computer gameplay incorporating character and narrative, whether or not they appear in three dimensions and/or use interactive Artificial Intelligence (AI), continue to require programming beyond the layman and often demand cost-prohibitive soft- and hard-ware for their presentation. This means that, for the live performance maker, the technology is currently at risk of being a hinderance rather than a help. And this is an important consideration, given the trajectory of creative academies and arts faculties in universities towards incorporating AR, VR and AI technologies into their theatre studies curriculums and research agendas, as well as the increasing interest from funding bodies to see digital elements pitched by performing artists as part of applications for financial support. While it is useful to encourage artists to adopt new technologies and build on traditional techniques and knowledge, it would be unfortunate to foster a situation where the plaustrum is placed squarely before the equus.

In many ways, theatre is a medium experienced in adopting technology into its created worlds and naturally subsumes new techniques and modes of information transformation and transmission as a natural evolution. A fact that bodes well for the eventual, complete subsumption of something like projection mapping into its creative process. Indeed, it is fine to argue that theatre is already a low-tech instance of augmented reality, with the theatrical elements of design – costume, lighting, sound, AV, set, props – the original augmenters. I would say that this argument is not entirely indefensible, and eventually AR and/or VR will become yet another tool of the theatre-maker's kit, but the technology is not quite there yet.

However, the multiple elements of and possibilities for theatre and technology should not be over-simplified, such that if “augmented reality means to integrate synthetic information into the real environment ... would a TV screen playing a cartoon movie, or a radio playing music, then be an AR display? ... Obviously, there is more to it. The augmented information has to have a much stronger link to the real environment” (Bimber and Raskar 2). Movement towards this more robust augmented information in theatre is, arguably, simply the digitisation and advancement of the process of intermediality that has already changed the way live performance is done (Chapple and Kattenbelt). Just as neither film nor TV replaced live theatre but influenced its style and form, particularly through acting styles and trends, so too will be the case for these other technologies, especially in light of their need for animation (Hayes and Webster) and how actors can find a place within this.

There is another consideration of how these and related technologies, both as they currently stand and in a future where they have found an indivisible place within live performance, might alter the theatrical landscape. Here, motion capture (MoCap) technology and animation are relevant. The underlying argument being that MoCap is a finite technology, in terms of its usefulness to actors of the future. The reality is, as motion is captured – to be used in the animation of these augmented and virtual

realities – universities, production studios and research and technology institutes record and store the data that documents that motion, and animators already have the skills and knowledge to write the code for realistically animated characters without a live body (Wise). Online resources that provide free, downloadable data of an extraordinary amount of everyday human actions have existed for some time now (CMU). The data available can be easily accessed and subsequently animated in any way you please. It follows, then, that once motion has been captured and stored the need for a human body to provide the motion for capture, particularly an actor trained in working with a MoCap suit, is removed. Why would a budget be used to pay an actor a substantial sum of money to generate a performance that can be digitally rendered from already available information? It is a controversial fact that animators are generally much cheaper than a star actor who, in any case, “can be seen as an above-the-line drain on production finance, an overvalued promotional figure taking credit for character expressivity that might be, in actuality, largely animated” (Bode 5).

While generally considered a concern of the film and television aspects of the industry, the immediate response to such a criticism is, of course, evidenced in the advent of the term Performance Capture (PerCap) as distinct from MoCap. While some do not distinguish between MoCap and PerCap there is “a movement in the works to replace the term ‘motion capture’ with ‘performance capture’ to shed a better light on what the actors do and how these films are created ... the technology captures every aspect of the actor's performance” (Schultz 12). There is no reason why the same argument should not be used to support the place of actors in live performance in both providing the physical body on stage as well as the template for any digitally rendered characters that may appear. Well-known thespians have consistently promoted PerCap as a specific technique and elevated skill, distinct from existing notions of MoCap and what it means (Wired). By consistently using the term “performance capture” to emphasise the work and skill of an actor to create a character for digital rendering, the argument is presented that motion captured for one character is not appropriate to be used for another character. The skill and uniqueness applied by an actor to each and every performance cannot be replicated but only supported and enhanced by an animator; and must be done so on a case-by-case basis for every character specifically created by an actor for each individual role.

Furthermore, “actors (including John Malkovich, Andy Serkis and James Franco) have asserted that techniques like performance capture and compositing actually “liberate” their acting process in different ways” (Bode 5). On the face of it, then, PerCap is likely a critical skill for the actor of the future, as well as the director if they are to work successfully with the performer. To understand and use this technology will enable actors to take their craft to the next level of its evolution. In many ways the format shift from film to digital – and from programmed consumption at cinemas or through traditional broadcasters to on-demand streaming services directly to multiple devices – has simplified, or made less complicated, the skills of an actor when performing for a camera: “there used to be a big difference between acting for film and acting for television ... These days, the actor often has no idea of what size screen his work will be shown on” (Tucker 23).

The distinctions here, then, are between traditional to-camera acting and PerCap acting, where the performance is delivered to a program and not directly to camera. In terms of to-camera acting, there is no longer a general difference between film and television but only difference found in the length of time it takes to film any one project, and an actor's ability to immediately switch between close up and long shot acting, both of which directly correlate to whether a shoot is single or multi-cam (Tucker 24-25). So, while the difference between acting for film and television is less and less a valid consideration, the distinction between acting for stage and acting for the screen, which includes PerCap, will remain for some time yet. Though, it is likely that while technology is levelling the styles and techniques employed by the screen and television actor, it will conversely require the stage actor to alter and redefine their methods of performance if digitally rendered characters are going to find a common place in onstage projections. The stage actor and live performance creator/performer can take note of this and would do well to also familiarise themselves with the techniques required to harness the technology.

Considering MoCap and PerCap and developments in animation that have led to an entirely digitally rendered actor – a performative being known as a “synthespian” – in cinema, it can also be noted that this has not (yet) entirely replaced the physically present actor on the screen. It has, however, “served as a catalyst for actors, theorists, and critics to clarify the specificity and value of acting” (Bode 10). For live performance, there will inevitably come a time when the physical and (a)live actor will have to interact with characters, sets and fantasies generated and projected onstage entirely through digital means, forcing them to reconsider and re-contextualise their place in the theatre. Given the significance of the live-ness of theatre as part of its shared experience between performer and audience and amongst performers and amongst audience, I do not see a future where live performance is replaced with entirely projected, pre-animated holograms. There will always be the want and the need for live bodies in the space – even if those bodies occupy a different space and are transmitted in real time – as this is fundamental to the rite and ritual that is the theatre. However, the live bodies of the performers will have to adjust in order to accommodate the inevitable real/rendered hybrid performance that the technology predicts and has already been established in film and television.

This hybridity of performance is different to an actor learning the skills to work while wearing a performance capture suit, but is similar to those performers that act in front of a green screen while staring at a small white ball, which takes the place of what will become a digitally rendered character on screen. What will happen, is that these digitally rendered characters will eventually be able to be projected live onstage in real time, not added independently of the performance and/or pre-programmed into an app that superficially overlays them through another medium, such as an AR enabled mobile phone. This will require performances and performance techniques unlike acting alongside another real-life actor as, at least for the foreseeable future, AI powering these characters will not be able to replicate the actor's “impulse”, a fundamental skill of a contemporary performer.

The idea of the “impulse” and performing “in the moment” is now a core tenet of contemporary Australian and Anglo-American acting traditions, which can trace its lineage through the teachings of Meisner, stemming from the conflict over interpretations of Stanislavskian realism that arose between Strasberg and Adler. It may be some time yet until AI can understand this evolution of the craft and be seen to be “carrying out an action in the moment with justification and particularization” (Tait 352) as the skilled and well-trained real-life actor does. As such, these digitally projected characters will have their movements, dialogue, actions and reactions pre-programmed for some time yet. It will be the skill of the (a)live actor to make these appear impulsive and true to the moment. Even though the fantasy world will be visible, the skills required will be more akin to green-screen acting, but in real time in front of a live audience.

Extending on this notion of AI and characters that are not only seen as interactive, but are also able to independently interact, explanation is offered for the title of this article, “Make it So”, a quote from Patrick Stewart’s character, Captain Jean-Luc Picard, made famous in the *Star Trek: The Next Generation* TV series. It was in this series that the hypothetical “Holodeck” first appeared and is the kind of augmented and virtual environment that would lend itself most usefully to the performance of live art. The direct reference to the phrase “make it so”, then, is a call-to-arms to those behind these technologies to present us with the non-fiction equivalent of the Holodeck so that we may use it to enhance our live theatrical performances. I do make one distinction, however, and that is in the importance of AI. For Picard’s Holodeck, AI is crucial as the fantasy worlds entered into are more akin to gameplay with the narrative situations to be acted-out by the individual in a pre-determined scenario. The individual is able to move through an augmented reality so the world itself and other “characters” must be able to interact with the (a)live participant in order for them to benefit from the experience and achieve a set of active and reactive aims or plot-points: it is a pick-a-path novel turned into a digital reality.

This kind of AI interaction, however, even when possible is not a necessity for live performance as being an audience member and watching protagonists and antagonists travel through a fixed-narrative story/journey is an insuppressible human want and a seemingly endless source of entertainment and joy. An audience does not need to manipulate and alter the narrative trajectory (though, for some shows this might be desirable and already happens in certain instances of interactive theatre) and the (a)live performers generally have no fundamental, dramaturgical reason to do this either. Regardless of intelligent interaction from digitally rendered characters, AR will undoubtedly enable the enhanced presentation of the fantastic for live theatre. Rather than simply replacing the characters of realism – i.e. humans playing a part become AI programs taking humanoid form and playing a part – animals, monsters and other-worldly creatures will be brought to stage, something that is currently often achieved through the use of puppets.

The idea of the Holodeck also suggests that artists and academics will have to more clearly delineate between the notion of interactive games/gaming as compared to a live performance that uses immersive AR. Currently, a distinction is clear where

participants are required to wear a device in order to view the AR of a digital world. Once the need for a device is removed, what becomes immersive – maybe even interactive – performance and what is gaming? Will the distinction be in the element of competition? Where playing a game gives some kind of inherent agency over how you interact and progress through the augmented world in order to achieve a pre-determined goal – whether that be to catch a digital animal in a ball, or to simply stay alive with other players “after you”. While, in the world of the story and storyteller (which theatre performers and makers exist in) the narrative intention for the audience could be said to be more passive.

While interactive theatre does give agency to audience members, the underlying purpose of the exercise more generally is to take the audience on a pre-determined journey through story and character in order to achieve a considered impact or provocation for the audience members. That impact/provocation is often political in nature and the purpose of the work therefore has a greater social, cultural, philosophical and artistic purpose. Perhaps, then, the more useful distinction to be drawn will not be between what is a game and what is performative art, but what is a game and what is purely entertainment. Perhaps here, at this future juncture of attempting to define activities based in augmenting technology, the greater friction will not be between art and technology, but between playing games and entertainment. Perhaps it is entertainment that will be subsumed into gameplay, not art. The two defining areas of cultural endeavour and enjoyment will not be a duality between entertainment and art, but between art and gameplay. Entertainment will simply be the happy result of both.

Whether or not it is required for the purposes of live theatre, there are those who suggest that the kind of AI demonstrated by the Holodeck is not so far away. Indeed, one educated estimation has this eventuating in as little as five to ten years (Zambetta). Even so, how long this takes to filter down into larger performance venues, such as well-funded State theatre companies, let alone into the hands of independent artists – who will arguably be the most likely to push the technology to its limits – is a different matter entirely. The closest thing we currently have to the Holodeck is projection mapping on moving surfaces, which requires mobile screens such as those used in the *Box* by production house Bot & Dolly (TCP Staff). Projection mapping gives the illusion of images with depth and can follow the action of a live actor/performer onstage who appears to interact with the displayed images. However, the interactions are naught but a series of tightly controlled choreographed movements on the part of the actor, matched with the finitely programmed movements of screens attached to robotic arms making them semi-mobile yet giving the impression of uninhibited movement in space. Of course, movement is inhibited by the tracks that the robotic arms move along, and the general restrictions that hydraulic joints are subject to (admittedly, just as human joints are limited by degrees of movement). Presumably, the cost of transporting these robots and the time and specialist knowledge required to program the projection mapping places them largely out of reach of most artists and storytellers. This current solution to generating multi-dimensional digital experiences is also not the fully-immersive world that Holodeck-inspired AR promises, but it is a step along the way.

Projection mapping and projection-based augmentation is the most promising area for live performance in terms of the stage moving more completely into the digital age. Some experts acknowledge the technique, or the ideas behind the technique, beginning as early as 1969 (Jones) and it has been employed with great interest in the areas of game development and design, entertainment and has also found profitable commercial applications (Benko et al.; Haller et al.; Marner et al.) but has yet to be fully extended into performing arts and the live disciplines within creative industries. There are also currently several “smart projectors” available that make complex calculations and subsequent adjustments in angle, colour correction, and other detailed responses to surface types so that projected images appear unadulterated regardless of the object receiving the picture (Bimber et al.). This means it is possible to project on to window curtains or wallpaper, brick walls or even overlaying images on hanging paintings and other artworks without interfering with the projection, which clearly bodes well for employing such technology into already available theatres and other live performance spaces. Couple this with devices such as Immersis, a projector that allows the image from a VR device – such as Leap Motion or Microsoft’s HoloLens – to be projected into a room for everyone to share the experience and the potential to bring the virtual into the actual is beginning to be illuminated (Probasco).

In light of all of this, the answer for dramatists and theatre makers and the next step towards our onstage Holodeck, as I have already alluded, will be found in the increasing improvements in projectors and projector technology. Even so, the advent of an image-generating device that can display a 3D picture to the naked eye in the middle of a sunny amphitheatre without a solid object behind the projection to catch the image, similar to R2-D2’s Princess Leia hologram (Lucas), is some time away. Where Virtual and Augmented Reality require devices and other objects of digital information management a theatre performance strictly requires as little as an imagination, but when the technology can adequately project the images from the creator’s imagination as part of the theatre performance is when these forms shall truly find synthesis. It may already be clear, but it seems relevant to highlight that as the writer of this article I am not a technician, developer, engineer or programmer of technology. I am a performing artist: a writer and director. Those with specialist knowledge may criticise and point out deficiencies in comprehension and understanding of the technicalities and complexities underlying how AR and/or VR actually work in discussing its applicability to the theatre. However, the point of view of active theatre makers is critical in the development of the technology in a way that is both useful and necessary for and to the artform.

To contextualise: I understand the effects and impact intermedial and lighting design elements can have on a performance and help to realise my vision without any specialist knowledge in how electricity, Light Emitting Diodes or Ultra High-Performance Lamps actually work. I am unaware of how my show’s audio track is converted from sound waves in the studio to a series of ones and twos as it is read and understood by the operating system controlling my QLab files; however, I can tell you exactly when it should do that and at what volume it should be heard to generate the most powerful emotional response from an audience. I am not aware how light is captured as pictures by a 4K UHD camera on my Pixel phone but I can certainly direct

the scene that it films, ensuring the pictures it does capture are exactly what the viewer wants and/or needs to see. This may sound a little flippant, or even arrogant and dismissive, that is not its intention but hopefully illustrates the point. Perhaps it is time for theatre makers and live performance generators to actively converse with the inventors and engineers about what we want from this technology in order to enhance our craft, in favour of potentially seeing it as entirely independent from our work resulting in a divergence of forms and knowledge instead of an evolutionary convergence of ideas and available tools.

I should also acknowledge that parts of this article may seem like I elevate theatre and performance to something that emerging and immersive technologies are subservient to. This is not my intention either. What I am drawing on is the fact that theatre, as an important cultural and social endeavour with entertainment value, has had thousands of years to explore its form and understand how its audiences interact with it and new technologies can benefit from this as much as the theatre can from them. Once technology can generate something close to the Holodeck on our stages, these forms can truly evolve as one. This will take theatre to a fantastically new level of possibility, and the technology will benefit from thousands of years of storytelling and artistic refinement to generate imaginative and dramatic worlds like we cannot yet even envisage.

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